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FINAL

**VOLUME I OF II
REVISED**

**LEACHATE COLLECTION SYSTEM
EXPEDITED FINAL DESIGN**

**BLACKWELL FOREST PRESERVE LANDFILL
DUPAGE COUNTY, ILLINOIS**

MAY 1997

PREPARED FOR:
FOREST PRESERVE DISTRICT
DUPAGE COUNTY, ILLINOIS

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PREPARED BY:
MONTGOMERY WATSON
ADDISON, ILLINOIS

PROJECT NO. 1252008.04090050




MONTGOMERY WATSON

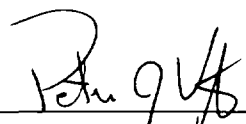
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DUPAGE COUNTY, ILLINOIS

MAY 1997


for Dean R. Free, P.E.
Project Engineer


Peter J. Vagt, CPG, Ph.D.
Project Coordinator



Walter Buettner, P.E.
Project Manager

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INTRODUCTION

GENERAL

This Expedited Final Design (Design) has been prepared by Montgomery Watson, on behalf of the DuPage County Forest Preserve District (FPD) of DuPage County, Illinois, for the Blackwell Forest Preserve Landfill (landfill). Refer to Drawing A2 for the landfill site location. The Design is submitted to meet the objectives required by the Scope of Work (SOW) (Appendix A to the Administrative Order by Consent (AOC) between the United States Environmental Protection Agency (U.S. EPA) and the FPD, U.S. EPA Docket No. V-W-'96-C-341, March 7, 1996).

The response actions specified in the AOC, and selected for implementation at the site, include landfill cap evaluation and repair, leachate extraction and disposal, gas venting, and the assessment and implementation of groundwater and leachate monitoring. The Work Plans addressing the response actions have been split into component pieces, including:

- 1) Installation of the leachate extraction wells;
- 2) Design of the Leachate Collection System (LCS); and
- 3) The Predesign Investigation and Cap Repair Design.

This submittal addresses the design of the LCS only. The leachate extraction wells were installed in June 1996, and the Predesign Investigation was undertaken in two phases in October 1996 and March 1997. Leachate extraction well logs and the results of the Predesign Investigation are presented under separate cover in an April 1997 Predesign Report.

SITE DESCRIPTION

The landfill is located approximately 6 miles southwest of downtown Wheaton, Illinois in Section 26, Township 39 North, Range 9 East, DuPage County, Illinois (Drawing A2). The Blackwell Forest Preserve encompasses 1200 acres of woodlands, grasslands, wetlands, and lakes. The landfill covers approximately 40 acres in the central part of the preserve.

SITE HISTORY AND BACKGROUND INFORMATION

The 40-acre tract which was developed into the landfill was purchased by the Forest Preserve District (FPD) in 1960. Over the following five-year period, approximately 1,100 additional acres were acquired by the FPD. The property was purchased with the intent of developing it as a forest preserve for recreational purposes, after construction of the landfill.

Originally, the FPD intended to use an abandoned gravel pit at the preserve for solid waste disposal. In 1963, gravel excavation was resumed, and continued until July of 1969.

During the course of the gravel mining, the lakes at the site were enlarged and deepened. The mined materials were sold to fund the lake construction, recreational projects, and flood control projects.

The intent was to construct a landfill that would limit the effects of waste disposal on the surrounding area, create a hill within the preserve which could be used for recreational purposes, and provide an economical means of constructing the lakes at the preserve. Therefore, the concept of landfilling in the gravel pit was abandoned. Excavation of the lakes would provide clay materials which could be used in construction of an environmentally secure landfill.

Concern regarding the suitability of the site for landfilling was expressed by several parties, including the Illinois State Geological Survey (ISGS), the Illinois Sanitary Water Board, and Northeastern Illinois Planning Commission (NIPC) personnel. These concerns centered on the site's geologic and hydrogeologic characteristics, including its position on the edge of the Warrenville cone of depression, extensive sand and gravel deposits in the area, and potential hydraulic connection between the recreational lakes and the buried refuse. In response to ISGS suggestions that careful engineering procedures would be necessary to develop a secure landfill at the site, the County Board of Commissioners approved development of an engineering plan for the project.

Landfill Design and Construction

Preliminary design specifications for the landfill were developed by William Rose and Associates (Rose) for DuPage County and submitted in October 1966. Rose recommended that the landfill cover a 35-acre area, that a three-to-one clay-to-refuse placement ratio be employed, and that the fill area be constructed as a honeycomb of one-acre cells. Each cell would have a 1.5-ft thick clay base and a perimeter clay berm 8 to 9 ft in height. Each cell would be filled with two 3-ft lifts of refuse, separated by 6 in. of clay. Each cell would be covered by 1.5 ft of clay, which would form the base of the overlying cell. The cells were to be offset to maximize stability in the landfill design. The cover design specified a final 12-ft layer of compacted clay, covered by soil and vegetation.

Construction of the landfill was performed as a joint effort between the DuPage County Public Works Department (PWD) and the FPD. Under the agreement between the agencies, the PWD was to build the landfill, under supervision by the FPD.

Construction of the landfill commenced in 1965. By 1967, the shape of the hill and general cell layout had been determined. The original landfill cell configuration consisted of eight cells. Cell 9 was not part of the original planned design.

The original layout of the landfill was generally followed. Daily records were not kept to detail how the construction proceeded. However, in general it was the procedure to develop cells several acres in size by building side berms, and then fill the cells with refuse and daily cover. At the completion of each cell, the clay cover was installed and side berms were constructed for the next lift of refuse. The clay covers served as the liners for the overlying cells, as the landfill construction proceeded upward.

The final load of refuse was accepted at the landfill in October 1973, and was buried just below an 800-ft Mean Sea Level (MSL) elevation in the Cell 4 area. Final contouring and landscaping continued until July 1975. Forty to sixty feet of clay were added to form the final hilltop at 839 ft MSL, approximately 150 ft above the surrounding natural topography. The landfill was covered to final grades with 2 to 15 ft of predominantly clay cover. Some areas of cover are underlain by layers of varying sand, gravel and clay composition. A final layer of a minimum of 4 to 6 in. of clayey topsoil was installed and vegetated.

The landfill contains approximately 1.5 million cy of refuse, classified as general household refuse and light industrial waste, and an equal volume of natural fill. Specific wastes known to have been disposed of at the landfill include:

- Eight thousand tons of dry sludge from the Metropolitan Sanitary District of Greater Chicago
- Daily trash from Owens-Illinois of St. Charles, Illinois glass manufacturing facility
- Plant trash from Kroehler Manufacturing of Naperville, Illinois
- Burnt tree cuttings and grass clippings

The landfill covers approximately 40 acres. The addition of several cells around the eight original cells increased the planned 35-acre landfill area to the existing 40 acres. These exterior cells were used for disposing of construction debris and tree trunks and branches and may not have been constructed with clay liners.

Post-Construction History

In March 1986, the site was evaluated by the U.S. EPA using the Hazard Ranking System (HRS). A composite score of 35.57 was assigned, with the following scores assigned to each potential route: Surface Water 0.0; Air 0.0; and Groundwater 61.54. The site was

proposed for inclusion on the National Priorities List (NPL) in the Federal Register, Volume 53, Number 122, dated June 24, 1988.

On September 25, 1989, a Consent Order was signed between the FPD of DuPage County and the U.S. EPA. The landfill received final listing on the NPL in the Federal Register, Volume 55, Number 35, dated February 21, 1990. Subsequent to the final listing on the NPL a Remedial Investigation/Feasibility Study was performed at the landfill.

EXPEDITED FINAL DESIGN

This Design for the LCS follows submittal of the Expedited Work Plan and PreFinal Design for the LCS (Montgomery Watson, April 1996). These documents had been originally prepared as a means of expediting the process required for design, review, and approval, so that installation of the LCS could take place during the 1996 construction season following installation of the extraction wells. Once it was realized that construction of the LCS could not be completed during the 1996 construction season, the expedited schedule was no longer an issue. Construction is now intended to start in the Summer of 1997.

Comments received regarding the Expedited Work Plan and PreFinal Design from U.S. EPA in a letter dated May 22, 1996 have been addressed in this Design submittal.

This Design consists of 4 sections and 8 appendices. Section 2 - Leachate Collection System Final Design, describes the LCS components and implementation strategy. Section 3 - Reports and Submittals, discusses the proposed project submissions. Section 4 - Project Schedule and Personnel, discusses the proposed project schedule (Figure 1) and the organization of the proposed key personnel responsible for implementing the response actions (Figure 2). Appendix A contains the AOC with the SOW and the U.S. EPA approval letter with comments. Appendix B includes construction specifications for the LCS. Appendix C includes the LCS capital cost estimate information. Appendix D includes design calculations. The Site Safety Plan (SSP) is included in Appendix E and is bound in Volume II of II of the Design. Volume II of II includes Appendices F and G, as the Construction Quality Assurance Plan (CQAP) and the Quality Assurance Project Plan (QAPP) - Addendum No. 1, respectively. The CQAP includes information that relates to field sampling. A separate field sampling plan was not prepared, since there is a small quantity of proposed sampling for the LCS construction.



LEACHATE COLLECTION SYSTEM EXPEDITED FINAL DESIGN

INTRODUCTION

This Design includes a detailed discussion of the LCS design, and provides final construction drawings and specifications as required by the SOW. The Design is the direct successor to the Expedited Work Plan and PreFinal Design (Work Plan) (Montgomery Watson, April 1996) which provided the U.S. EPA with the proposed approach to the LCS design and implementation. The Work Plan was approved May 22, 1996 (Appendix A2). Following approval of this Design, construction of the LCS will be implemented.

LEACHATE COLLECTION

General

The functional goal of the LCS is to remove landfill leachate for treatment and disposal. The operational goal of the leachate system is to reduce the leachate elevations within the landfill. In general, leachate extracted from the extraction wells will flow by gravity to the leachate holding tank located at the northwest corner of the landfill. The leachate collection system includes extraction wells, leachate well pumps, wellheads, leachate conveyance pipes, driplegs, a lift station, a holding tank, a compressor station, and system controls. Leachate will be periodically pumped from the holding tank and trucked to the local public wastewater treatment plant for disposal under FPD's permit.

Under the current designs, landfill gas (LFG) from the leachate extraction wells will be collected in LFG header pipes, and passively vented through a single vent located on the top of the landfill near extraction well EW04. If future monitoring indicates that an active LFG system is necessary, the passive system can be upgraded. The criteria for implementing the active gas extraction system will be outlined in the Operations and Maintenance (O&M) Plan.

Limiting Factors

There are several factors which may inhibit leachate flow and recoverability from the landfill, including:

- Low-permeability, intermediate or daily cover layers within the landfill which may impede the vertical or lateral flow of leachate.
- Landfill construction techniques or disposed materials, which isolate or perch leachate, and limit flow to extraction points.
- Porosity, permeability, and varying nature of fill materials surrounding the extraction wells, which influence the rate and quantity of leachate that reaches extraction wells.

These factors may vary significantly across the landfill, from one leachate collection point to another and the effectiveness of the LCS is difficult to predict. Therefore, the present design allows for enhancement and expansion of the collection system. The Construction Quality Assurance Plan (CQAP) (Appendix F) provides a detailed summary of the data that will be collected to document the system performance. The data will be evaluated and used to make recommendations to fine-tune, modify, or expand the system toward optimizing leachate reduction in the landfill. Upon approval by U.S. EPA and IEPA, plans would be developed to modify the system as determined necessary.

LEACHATE SYSTEM COMPONENTS

Extraction Wells

The LCS designed for the landfill incorporates nine existing extraction wells (EW01, EW01A, and EW02 through EW08) spaced in an approximately uniform grid across the site and located in the areas with the highest known leachate head levels. Extraction well EW01A was added next to EW01 to maximize contact with potential liquids, and the two wells are located on each side of a subsurface berm. The design and implementation approach for the extraction wells was described in the Partial Work Plan (October 1995, Montgomery Watson). The nine extraction wells were installed by June 13, 1996. Construction documentation for the wells is presented in the Predesign Report (April 1997, Montgomery Watson). Refer to the leachate collection system layout on Drawing D1 for record well locations. Also refer to Drawing D2 for additional extraction well details.

Leachate Well Pumps

Each of the nine extraction wells will be fitted with a pneumatic leachate extraction pump. A pneumatic pumping system was chosen because it offers the following advantages over other submersible pumps:

- Electricity is required only at the compressor station. No electricity is needed at the well.
- Superior solids handling capabilities.
- Pump and controller are explosion-proof; excess pump/compressor air will be discharged to the atmosphere. Air will not be introduced into the wells.
- A minimum of down-well moving parts and controls minimize maintenance and operator exposure to landfill gas and leachate.
- Low and variable flow rates are tolerated (1 gpm typical for each pump).
- A wet well is not required.
- Pumps can run dry without damage and are not affected by high temperatures.

Wellheads

Each wellhead will be installed below grade within a large diameter vault with locking lid constructed flush with the landfill surface. A wellhead will connect the vertical well pipe to the buried leachate conveyance pipe. Refer to the wellhead detail on Drawing D2. Gas header pipe will extend to each of the extraction wells and will be connected to the wellhead. The wellhead will be composed of Schedule (SCH) 80 polyvinyl chloride (PVC) pipe, and includes the following components:

- A section of flexible tubing to allow for differential settlement between the well and leachate conveyance pipe (the tubing will provide double containment for the leachate discharge hose).
- Fittings to allow access to pneumatic leachate pump controls and to provide for leachate sampling and head measurement.

Leachate extracted at wells EW01, EW01A, and EW02 through EW04 discharges directly to the gravity leachate conveyance pipe. From these wellheads, the 6-in. diameter conveyance pipe riser will connect to the 6-in. diameter leachate conveyance pipe with a 45° elbow and a 45° wye (or two 6-in. 45° elbows, if the well is located at the end of a pipe branch) to facilitate pipe access and cleaning. Refer to the wellhead and riser details on Drawing D2. Leachate extracted from wells EW05 through EW08 will discharge to a common leachate pressure conveyance pipe constructed of 2-in. SDR-17 high-density

polyethylene (HDPE) pipe. Liquid conveyance is discussed in greater detail in the following sections.

The volume of leachate pumped from each well will be recorded using a non-resettable counter. The counter values will be transmitted through control wires to the compressor station control building, and will be available to the system operator.

Conveyance Pipe Systems

The leachate conveyance pipe system transports leachate from the wells to the buried holding tank located at the northwest corner of the landfill. Leachate from five of the leachate extraction wells (EW01, EW01A, EW02, EW03, and EW04) flows by gravity directly to the buried holding tank. The remaining four extraction wells (EW05 through EW08) discharge to a common pressurized conveyance pipe which directs the liquids into the gravity conveyance pipe near EW04. Lift station LS01, located on the south side of the landfill, also pumps liquids collected from existing Manhole MH20 to the same pressure conveyance pipe. MH20 currently collects liquids from a subsurface water collection trench.

The LCS system is designed to allow liquids from existing Manhole MH3 to drain either to the leachate gravity conveyance pipe, or to existing Manhole MH2. This will be accomplished by constructing an HDPE gravity discharge pipe, fitted with a valve, from MH3 to the gravity leachate pipe. The existing pipe connecting MH3 to MH2 is already fitted with a valve. Currently, MH3 collects liquids from a subsurface water collection trench running from MH6 to MH3. These liquids are currently removed by the FPD for disposal at a local POTW. The sources and quantities of these liquids will be evaluated during LCS installation and cover repairs. If the liquids are determined to be impacted by landfill leachate, the liquids will be directed into the LCS. If the liquids are determined not to be impacted, they will be directed to MH2, which in turn will direct water to a discharge point located further to the north.

Gas header pipe will extend to each of the extraction wells and be connected to the wellheads. Pipe access points are located at the wellheads and at the cleanouts located at the driplegs. Any condensate that would form in the gas header pipe would be collected through driplegs DL01 and DL02. Dripleg DL01 would discharge to lift station LS1. Refer to Drawing D1 for the LCS layout.

A minimum of 6-in. diameter pipe will be used for the leachate gravity conveyance and gas header pipes. This is to allow for greater potential settlement in the pipe without liquids blocking off the gas flow, and to reduce the head losses in remote portions of the pipe system. High density polyethylene (HDPE) gas header and liquids conveyance pipes will be joined by the butt fusion method. Butt fusion joints are stronger than the pipe wall under both "quick burst" and "tensile pull" tests.

The pipe inverts will be placed a minimum of 4 ft below the existing surface elevation for frost protection. A continuous warning ribbon, placed above the pipes, will alert future

excavators of the pipe locations, and aid in locating the pipes in the future. To allow for potential differential settlement and the drainage of liquids in the pipes, the leachate gravity conveyance and gas header pipes will be sloped at a minimum of 2.0%. To facilitate system installation, pipe will be placed in the same trenches, when possible. A single pipe trench may include some or all of the following:

- Leachate gravity conveyance pipe,
- Leachate pressure conveyance pipe,
- Compressed air line for pneumatic leachate extraction well and lift station pumps,
- Gas header pipe, and
- Control wires that carry pump cycle count information for determining volumes pumped.

The pipes listed above are typically bedded with a minimum of 6-in. of compacted pipe bedding material on all sides. Each pipe is typically standard dimension ratio 17 (SDR17) HDPE pipe of various diameters. SDR17 is defined as the outside diameter of the pipe being 17 times the thickness of the pipe wall. Typical pipe bedding details are shown on Drawing D2. Actual invert elevations will be determined using survey information obtained prior to construction. Documented pipe locations and invert elevations will be presented in the Completion of Work Report.

Landfill Gas Venting

The LFG collection system will be initiated in a phased approach. The first phase consists of passively venting the nine leachate extraction wells through the LFG header pipe to a single vent pipe stack located on the top of the landfill. The vent stack will be constructed of 6-in. Schedule 40 galvanized steel pipe extended to a height of 25 ft above the existing surface elevation. Venting the LFG at this height will allow for sufficient dispersion of the LFG. The vent stack will be topped with a tee to reduce moisture from entering the pipe stack. The ends of the tee will be covered with a steel mesh to serve as a bird screen. The vent stack will be installed to a reinforced concrete base and additionally supported with galvanized steel guide wire restraints on three sides. Refer to Drawing D3 for the vent stack details.

The quality and quantity of LFG venting will be monitored over a short period of time, and based upon the monitoring results, the need for a passive vent flare will be evaluated. If gas flaring is technically possible, and determined to be necessary, a passive flare will be installed. The monitoring requirements and criteria for selecting a flare will be provided in the O&M Plan.

The LFG system is designed to be upgraded in the future, if necessary, to an active gas system. An active gas system will be required if it is determined that uncontrolled gas emissions are occurring through, or around, the landfill cap. The future O&M plan will include the specific criteria for upgrading the system from passive to active.

The design of the active gas system is not included in this design report. However, if an active system is required, a design will be prepared for Agency approval. The design will include the abandonment or removal of the passive gas vent described above, and installation of a new gas flare located north of the landfill. The exact location of the new gas flare will be determined in the future. The new gas flare will be connected to the existing gas header pipe near the compressor station, and a new blower will be installed.

Final Cover Restoration

Piping runs within the landfill refuse limits will be placed in a trench that is constructed in the landfill cover. Refer to the typical pipe bedding details included on Drawing D2. The landfill cover areas, and areas located outside the refuse limits, which are disturbed during construction will be restored to a condition equivalent to that before construction.

Silt fencing will be installed on an as needed basis, directed by the Engineer, to limit sediment transport from work areas.

The excavated topsoil and clay cover materials removed during trenching operations will be salvaged and reused during backfilling operations. Soil density testing of clay cover soils replaced during pipe trench backfill operations will be performed during construction. A Troxler nuclear density/moisture meter will be used to perform the density tests. The standard operating procedure (SOP) for the Troxler meter is included in the Quality Assurance Project Plan (QAPP) (August 1996, Montgomery Watson).

If additional off-site clay is needed to complete construction of the LCS, only clay designated CL-ML, CL, or CH by the Unified Soil Classification System will be used. Refer to the Specifications (Appendix B) and the CQAP (Appendix F) for compaction criteria.

Excess excavated soil, that has not come into contact with landfill refuse, will be used a grading material elsewhere on the landfill. If the landfill cap repair is conducted concurrently with LCS construction, this excess soil will be incorporated beneath the new cap material.

Driplegs

If future active gas extraction becomes necessary, condensate that forms in the gas header pipe system will be collected in and removed from two driplegs (DL01 and DL02). The driplegs are designed as negative pressure driplegs since they would function under active gas extraction if utilized in the future. Refer to the dripleg design calculation in Appendix D. The elevations of the gas header inlet pipe and the condensate outlet pipe control the liquid level in the trap by providing a seal so vacuum pressures can be maintained in the gas header pipe. Condensate removed at dripleg DL01 will flow by gravity to lift station LS1, and condensate removed from DL02 will flow directly to the buried holding tank. Refer to Drawing D1 for dripleg locations. The lift station is discussed further in the following sections.

Each dripleg assembly consists of a "U"-shaped, liquid-filled trap (similar to a residential plumbing trap) constructed of 6-in. diameter HDPE pipe. The higher leg of the assembly is connected to the gas header pipe. The lower leg has an outlet connected to a 6-in. diameter HDPE conveyance pipe. Each dripleg includes a connection to the gravity leachate conveyance pipe to receive leachate from the extraction wells. Both risers are extended to the surface and capped above-grade with bolted flanges to allow access for maintenance. Dripleg DL01 is located within the refuse limits and will be installed in compacted select granular fill. Dripleg DL02 will be encased in clay, as shown on Drawing D3, since it is located outside the refuse limits.

If active extraction is utilized, dripleg water levels will be verified as part of routine O&M, to prevent the escape of gas, if active extraction is utilized. In the current design, the gravity discharge of extracted leachate is routed through the dripleg so that it will continuously replenish the liquid level. Extracted gas that flows through the driplegs is forced to take a 90° turn upward at the dripleg cleanout riser to increase condensate removal efficiency. Refer to details on Drawing D3.

Lift Station

One lift station is proposed for the LCS. Lift station LS1 will collect liquids by gravity from Manhole MH20 and condensate from dripleg DL01 during active gas extraction, if utilized. Lift station LS1 will pump leachate, through a leachate pressure conveyance pipe, to the system high point (near EW04) where the liquids will flow by gravity to the buried holding tank. The lift station is located within the identified refuse limits and will be backfilled with aggregate fill below the base of the exposed landfill cover. Compacted clay will be used to backfill the excavation to the top of the landfill liner. Refer to Drawing D1 for the location of the pressure conveyance pipe and lift station LS1.

The lift station will be constructed of 24-in. diameter SDR-11 HDPE pipe with flanged and sealed base and top. The lift station will include installation of a surface vault structure similar to that for the wellheads. The lift station includes one pneumatic submersible leachate pump and a back-up manual tank-truck loadout pipe. The pump will operate at 3 to 4 gpm. The liquid volume pumped from the lift station will be recorded using a non-resettable counter. The counter value will be transmitted through a control wire to the compressor station control building where operating personnel can observe lift station performance.

Excavation of Waste

Based upon the results of the Predesign Investigation, it appears that refuse will not be encountered during the excavation of the conveyance pipe systems. However, buried wood or construction debris may be encountered in the excavation for lift station LS01 and drip leg DL01. A design goal of the lift station and drip leg is to minimize or avoid waste excavation. Therefore, during construction of the LCS, a field investigation will be undertaken to assess the subsurface conditions in the immediate area and to determine an alternative location for LS01 and DL01 where the waste thickness is at minimum or is

missing. LCS components may also be resized to accommodate any refuse. The results of the investigation and any proposed design modifications will be provided to the Agencies.

If waste must be excavated, it will be contained in roll-off boxes and tested for characteristics of hazardous waste using Toxicity Characteristic Leaching Procedure (TCLP) protocols. If the tested material is classified hazardous, it will be disposed of following the guidelines in Section V.7 of the Consent Order (Appendix A1). Refuse sampling, testing, and hauling will be the responsibility of the contracted solid waste disposal facility. If the tested material is classified as non-hazardous, it will be disposed of at a licensed municipal solid waste (Subtitle D) disposal facility.

Leachate Holding Tank

A double-wall steel-reinforced STI-P3 leachate holding tank will be installed below grade at the northwest corner of the landfill to collect the extracted leachate. The tank and related piping conforms to Resource Conservation and Recovery Act (RCRA) requirements. A 10,000-gallon tank was selected based on an estimate of the average steady-state leachate production and the availability of tank truck loadout scheduling. Estimated leachate extraction rates are 100-gal/day/well which results in an approximate 9-well total of 6,300 gal/week. The holding tank will have an approximate 10-day capacity before loadout is needed. The flows are anticipated to be greater early in the operation of the LCS, until leachate head levels are lowered.

The tank will provide monitoring capabilities for the interstice (space between the double walls) with a conductivity probe, which will shut down the LCS in the event moisture is detected. The probe sensitivity will be set to detect actual leaks and not humidity that may be present between the walls and at the bottom of the interstice. If a leak is detected, the LCS will be shut down. The system will not be restarted until the cause of any interstitial alarm condition is determined and corrected.

The conductivity probe is attached to a wire that is lowered down a riser pipe. The pipe attaches directly to a flange that accesses the space between the two walls of the double-walled tank. The probe sensitivity will be adjusted using water prior to insertion, and will be set just off the bottom of the tank interstice. The riser and wire penetration will be made with an air tight cap. The wire will be run underground in a conduit to the control panel and alarm system connections. The draft O&M Plan will discuss contingencies for the detection of tank interstitial moisture.

The tank will include two float sensors. The first high-level float will notify operating personnel that the tank is nearly full. A second high-level float will notify operating personnel that the tank is full and that the LCS has been shut down. The float settings will be set such that 7,500 gal is the first high level float alarm setting and 9,000 gal is the second high-level float alarm setting. All alarm conditions will signal system telemetry and activate a warning light visible to operating personnel when they approach the tank area. Telemetry is discussed in the following section.

The leachate tank will be ballasted with concrete deadweights to minimize the potential for tank buoyancy when empty. A buoyancy calculation has been prepared and is included in Appendix D. The tank includes cathodic protection and an STI-P3 polyurethane resin coating to reduce corrosion. For holding tank details, refer to Drawing D4.

Leak Detection Riser

A leak detection riser will be installed on the leachate conveyance pipe from dripleg DL02 just before the pipe's connection to the holding tank. The detection riser is designed to detect leaks in the 6-in. leachate conveyance pipe by collecting any liquids that form inside the 10-in. containment pipe. The leak detection riser will be installed such that it is located at the low point of the pipe run from DL02 to the tank. The leak detection riser will be fitted with an electronic leak detection probe similar to that of the interstitial tank system. The system will not be restarted until the cause of any leak detection riser alarm condition is evaluated and corrected. Information regarding corrective action to be taken in the event a leak is detected will be described in the O&M Plan. Refer to Drawing D4 for the leak detection riser location and construction details.

Leachate Loadout and Disposal

As part of the LCS, a loadout facility was designed to allow removal of leachate from the holding tank. The loadout includes a suction standpipe with a quick-connect coupling to allow leachate removal from the tank using a standard tank-truck hose. A spill containment basin is located at the suction standpipe to catch spills that may occur during leachate removal. Normally, the catch basin will be covered to prevent precipitation from being collected. Leachate spills that may be collected in the basin can be drawn up into the tank truck for disposal, as necessary.

The leachate will be loaded into a tank-truck and hauled to the Wheaton Sanitary District Wastewater Treatment Plant (WWTP) in Wheaton, Illinois, or equivalent appropriately permitted facility. The leachate will be tested by the WWTP, based on their acceptance requirements. Leachate pretreatment is not expected to be necessary based on historical data. Applicable WWTP permits will be included with the Draft O&M Plan. Sediment accumulation within the tank is not expected at a significant rate. If sediments must be removed and disposed of, TCLP analysis will be performed and disposal will occur at a properly permitted facility.

The loadout facility location and leachate holding tank layout will be field-fitted based on topography to take advantage of surface water drainage patterns. The facility will be constructed and graded to minimize surface water run-on, reduce the potential for erosion, and prevent unnecessary water from entering the leachate holding tank system.

System Controls and Telemetry

The LCS will be controlled by a main control panel at the compressor and control system station located at the northwest corner of the landfill. The main control panel will include manual and automatic system start-up and shut-down controls for the overall LCS, holding

tank, and compressor status monitoring. The leachate extraction well pumps are controlled at each individual wellhead, but are all shut down if any system alarm condition occurs, as described below, except for the first high-level tank alarm. The lift station pump will be operated in the same manner.

A telephone telemetry system will be installed at the main control panel. The telemetry system will notify operating personnel of the FPD when a predetermined alarm condition has occurred. Personnel may contact the telemetry system at any time to verify operating status. Expected alarm conditions will be as follows:

- Power failure
- Compressor shutdown
- First high-level leachate condition in holding tank
- Second high-level leachate condition in holding tank
- Tank interstitial moisture detection

The operating personnel will be identified in the Draft Operation and Maintenance Plan discussed in Section 3.

Compressor Station

Air pressure is delivered to each extraction well by a 2-in. diameter SDR-17 HDPE pipe buried in the same trench as the gas header and leachate gravity and pressure conveyance pipes. The compressor system will include a desiccant air dryer, to maintain dry supply air to the leachate extraction pumps to minimize freezing situations. The compressor system and system controls will be housed in a pre-engineered and tested building.

The compressor station, including pumps, compressors, and building foundation, will be sized, designed, and provided as a package by a single supplier. Once the supplier has been contracted, the sizing and selection criteria will be presented as an Addendum to this design report.

Construction Survey

Surveying will be performed at the landfill prior to construction. The following locations will be staked and surveyed for existing ground elevations:

- Location of intermediate header pipe fitting locations (these are typically at pipe bends, pipe intersections, or changes in pipe slopes)
- Location of the driplegs, DL01 and DL02
- Location of the lift station, LS01
- Location of the leachate holding tank
- Location of the compressor station and building

With this information, the LCS layout may be refined prior to, and during, actual construction to match the conditions existing at the site.

Site Security

During construction of the LCS, reasonable site security measures will be taken to limit public access to areas of construction or potential contamination. Site security will consist of:

- General Warning Signs (e.g., at site entrance, around work areas, on Hazard Barriers)
- Hazard Barriers (e.g., fencing, barricades, excavation coverings)
- Routine inspections of the site security measures
- Necessary maintenance

Any incidents related to site security will be documented and reported to the U.S. EPA.

LEACHATE COLLECTION SYSTEM CONSTRUCTION

General

Construction activities will be performed in accordance with the performance standards and specifications outlined in the SOW and with the general industry standards 29 CFR, parts 1910 and 1926. Qualified personnel will be on-site during construction to observe and record the system construction; perform field soil testing; collect representative soil samples for laboratory testing; oversee site safety concerns; and confirm the system is constructed in conformance with the design. During LCS construction, the following activities will be completed in accordance with the SOW:

- Preconstruction Meeting
- PreFinal Inspection
- Final Inspection

The meetings and inspections are described in more detail in the CQAP in Appendix F (Volume II of II).

Construction Specifications

The construction specifications for the LCS are presented in Appendix B.



REPORTS AND SUBMITTALS

This section discusses the reports and submittals for the landfill response actions described in the previous sections of the Design.

MONTHLY PROGRESS REPORTS

Monthly Progress Reports will be submitted to the U.S. EPA as required by the AOC. The progress reports will contain at a minimum the following:

- Significant developments during the period
- Work performed and problems encountered
- Analytical data received during the period
- Developments anticipated for the next period
- Schedule of work to be performed
- Anticipated problems
- Planned resolutions of past or anticipated problems

The Monthly Progress Reports will be delivered to U.S. EPA by the tenth business day of the following month. Reports will be addressed to the U.S. EPA Project Manager, with copies to Kurt Lindland (U.S. EPA Assistant Regional Counsel) and Rick Lanham (IEPA Project Manager). Refer to Figure 3 for the project correspondence list which includes telephone numbers and addresses for project participants.

PERFORMANCE STANDARDS VERIFICATION PLAN

The Performance Standards Verification Plan has been prepared with this Expedited Final Design for the LCS and includes the following:

- Site Safety Plan, which includes contingency and air monitoring plans
- Construction Quality Assurance Plan, which includes field sampling plans
- Quality Assurance Project Plan-Addendum No. 1

These plans are further described in the following subsections.

The criteria for assessing the effectiveness of the LCS for removing leachate from the landfill, or for determining whether the passive LFG venting system should be upgraded to an active system, will be presented in the Draft O&M Plan for the LCS. Criteria for assessing the effectiveness of the LCS will include monitoring leachate levels, recharge rates, and leachate quality for the extraction wells. The leachate monitoring will be performed during the system operational phase. The system operation may include cycling (on-off) and continuous operational periods for the first several months of operation to sufficiently assess the LCS performance. The criteria for upgrading the LFG system to an active system will include observances of uncontrolled LFG emissions through or around the landfill cap, and buildup of LFG pressures.

Site Safety Plan

A Site Safety Plan (SSP) has been prepared for the leachate extraction well construction. This SSP includes those activities associated with the LCS construction and addresses the following topics outlined in the SOW:

- Facility description
- Personnel
- Levels of protection
- Safe work practices and safe guards
- Medical surveillance
- Personal and environmental air monitoring
- Personal protective equipment
- Personal hygiene
- Decontamination - personal and equipment
- Site work zones
- Contaminant control
- Contingency and emergency planning
- Logs, reports, and record keeping

The SSP is included with this submittal in Appendix E of Volume II of II.

Contingency plans are included with the SSP describing procedures to be used in the event of an accident or emergency at the site. The SSP includes the following:

- Name of the person, or entity, responsible for responding in the event of an emergency incident.
- Plans and date(s) for meeting(s) with the local community, including local, State, and Federal agencies involved in, or affected by, the cleanup. Local emergency squads and hospitals will be coordinated separately by the DuPage County FPD.
- First aid medical information.

Based on discussions with the U.S. EPA, air monitoring will be performed during construction for site personnel as described in the Site Safety Plan in Appendix E.

Construction Quality Assurance Plan

A Construction Quality Assurance Plan (CQAP), included in Appendix F of Volume II of II, was developed with the purpose of completing the project to meet design criteria, plans, and specifications. The CQAP contains the following:

- Responsibilities and authorities of organizations and key personnel
- Qualifications of the Quality Assurance Official
- Protocols for sampling and testing used to monitor construction
- Identification of proposed quality assurance sampling and monitoring activities
- Reporting requirements for CQA activities

The field sampling activities included in the CQAP, address sample collection associated with the LCS implementation. Sample collection will generally be performed to gather the following information:

- Waste classification, if waste is excavated
- Clay compaction tests using a Troxler meter at 100-ft intervals, per 12-in. lifts, along the trenches; and as determined necessary for other excavations

The field sampling activities were developed following the requirements established in the "Guidance for Conducting Remedial Investigations and Feasibility Studies Under CERCLA," October 1988.

Quality Assurance Project Plan Addendum

The QAPP was submitted August 1996 with the Predesign Investigation and Cap Repair Design and includes descriptions of:

- Project Description
- Project Organization and Responsibility
- Quality Assurance Objectives for Measurement Data
- Sampling Procedures
- Sample Custody
- Calibration Procedures and Frequency
- Analytical Procedures
- Internal Quality Control Checks
- Data Reduction, Validation, and Reporting
- Performance and System Audits
- Preventative Maintenance
- Specific Routine Procedures to Assess Data Precision, Accuracy, and Completeness
- Corrective Action

- Quality Assurance Reports to Management

Addendum No. 1 to the QAPP has been prepared as a supplement to the QAPP to provide information for the additional work associated with the Design for the LCS. Addendum No. 1 is presented as Appendix G included in Volume II of II of the Design.

DRAFT OPERATION & MAINTENANCE PLAN

A Draft O&M Plan will be prepared and submitted after the submittal and approval of the Design of the LCS, as a separate report. This will allow for information to be gathered from contractors and suppliers for specific approved LCS equipment and operations plans. The Final O&M Plan will be prepared during construction of the LCS and will be submitted to the U.S. EPA prior to the PreFinal Construction Inspection for the LCS. The O&M Plan will include at a minimum the following:

- WWTP correspondences/permits
- Descriptions of normal O&M activities
- Description of potential operating problems
- Description of routine monitoring and laboratory testing
- Description of alternative O&M activities
- Corrective Action Plans
- Safety Plans
- Description of equipment and parts
- Records and reporting mechanisms required
- Criteria and rationale for expanding the LCS or terminating operation
- Brief description of potential active gas extraction system equipment, operations, O&M, and criteria for upgrading the passive gas extraction system to an active system

The O&M cost estimate will be submitted with the Draft O&M Plan and will be further refined in the final O&M Plan submittal. The O&M Plan will include contingencies related to the air monitoring requirements outlined in the SOW Section II 3(c). Design changes to the LCS would be addressed in Design Addendums to an approved Design.

CAPITAL COST ESTIMATE

The capital cost estimate for construction of the LCS is approximately \$800,000, present value. Cost estimating details are provided in Appendix C and are based upon item quantities from the LCS Design presented herein.

COMPLETION OF WORK REPORT

Within 45 days of a successful final construction inspection, a Completion of Work Report will be submitted to the U.S. EPA to provide a record of the LCS construction. The report

will describe construction quality assurance efforts used during construction and will include, at a minimum, the following:

- Description of LCS construction activities
- Record locations and installation of LCS components
- Waste spoils disposal
- System integrity testing
- Cover restoration activities
- Documentation of system start-up activities
- Record drawings
- Photographs that depict construction activities and record conditions
- A description of any deviations from the approved plans



PROJECT SCHEDULE AND PERSONNEL

REVISED PROJECT SCHEDULE

The Proposed Project Schedule (Figure 1) details when each task of the response actions will take place. The activities associated with the Design and construction for the LCS response actions, as well as the cap repair design and construction, are included in the schedule. The LCS construction timeframe indicated on the Schedule is approximate based on Design approvals and notice to proceed.

The schedule shown in Figure 1 is an expedited schedule that completes the LCS and cap repair construction in the 1997 construction season.

Additional LCS construction information is presented in the CQAP (Appendix F, Volume II of II).

PROJECT PERSONNEL

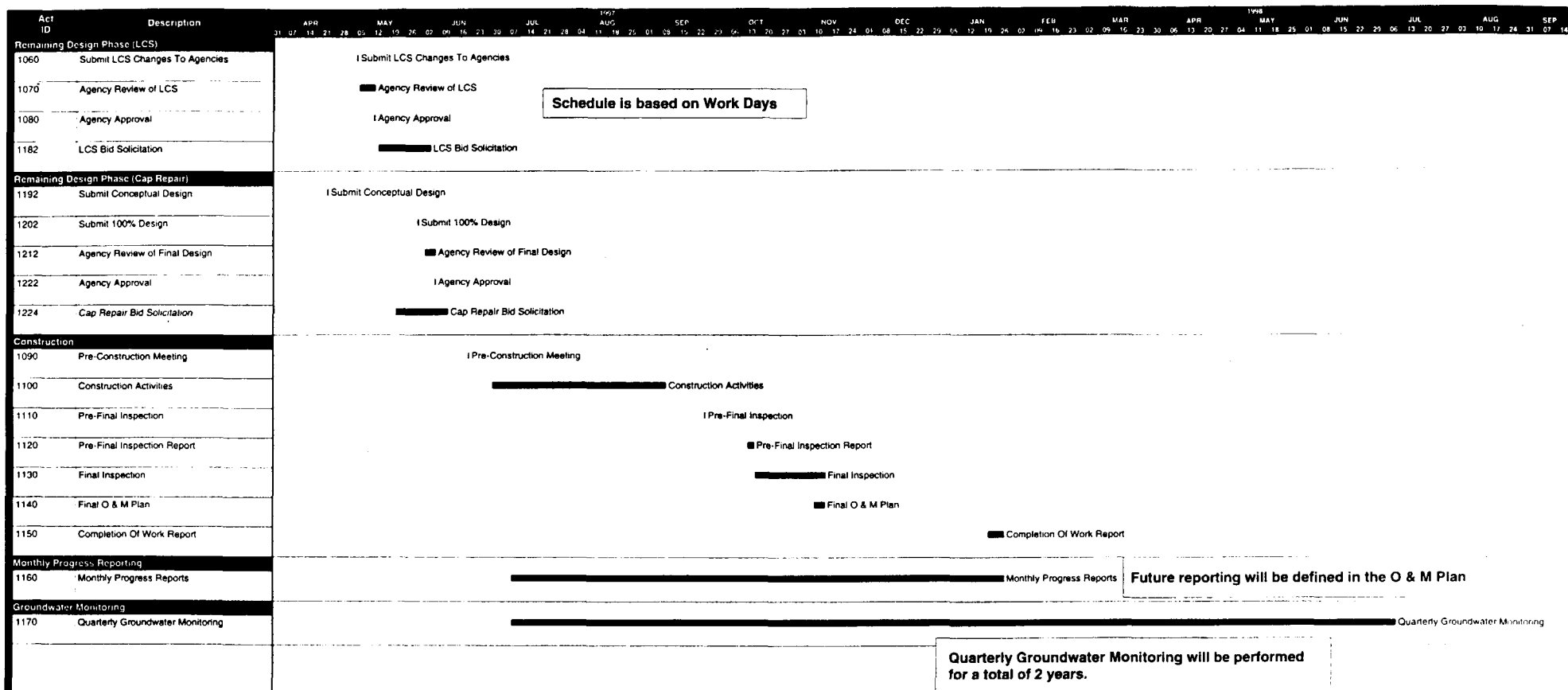
The project personnel are indicated on the organization chart presented as Figure 2. The project is led by U.S. EPA Region V Remedial Project Manager, Michael Bellot, phone number (312) 353-6425, and fax (312) 353-5541. He is supported by Mr. Rick Lanham of the Illinois EPA. The Respondent, FPD, is the owner of the DuPage County Landfill / Blackwell Forest Preserve in DuPage County, Illinois. Montgomery Watson, preparer of this submittal, is the Contractor selected to implement the response actions set forth the AOC and SOW.

The following are the key Montgomery Watson personnel for this project and their related qualifications:

- Peter J. Vagt, Ph.D., P.G. - Project Coordinator - Peter has been a project manager and project coordinator for three other CERCLA sites in Region V.
- Walter Buettner, P.E. - Project Manager - Walter has been a project engineer or manager for three other sites in Region V.
- Tom Blair, P.E. - Project Engineer - Tom has been a project engineer for two other sites in Region V, and four other sites in Region VII.
- Project Hydrogeologist - To be determined.

Additional project organization and responsibilities information is presented in the CQAP (Appendix F - Volume II of II).

DRF/vlr/dlp/DWH/WGB/PJV
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1252008.04090050



Company name: Montgomery Watson
 Run date: 01MAY97
 Start date: 01APR97
 Finish date: 06JUL98
 © Primavera Systems, Inc.

Figure 1
 Expedited Project Schedule
 Blackwell Landfill Site
 DuPage County, Illinois
 Montgomery Watson

- Early bar
- Progress bar
- Critical bar
- Summary bar
- ▲ Progress point
- ▲ Critical point
- Summary point
- ◆ Start milestone point
- ◆ Finish milestone point

ORGANIZATION CHART

BLACKWELL LANDFILL RESPONSE ACTION-LCS

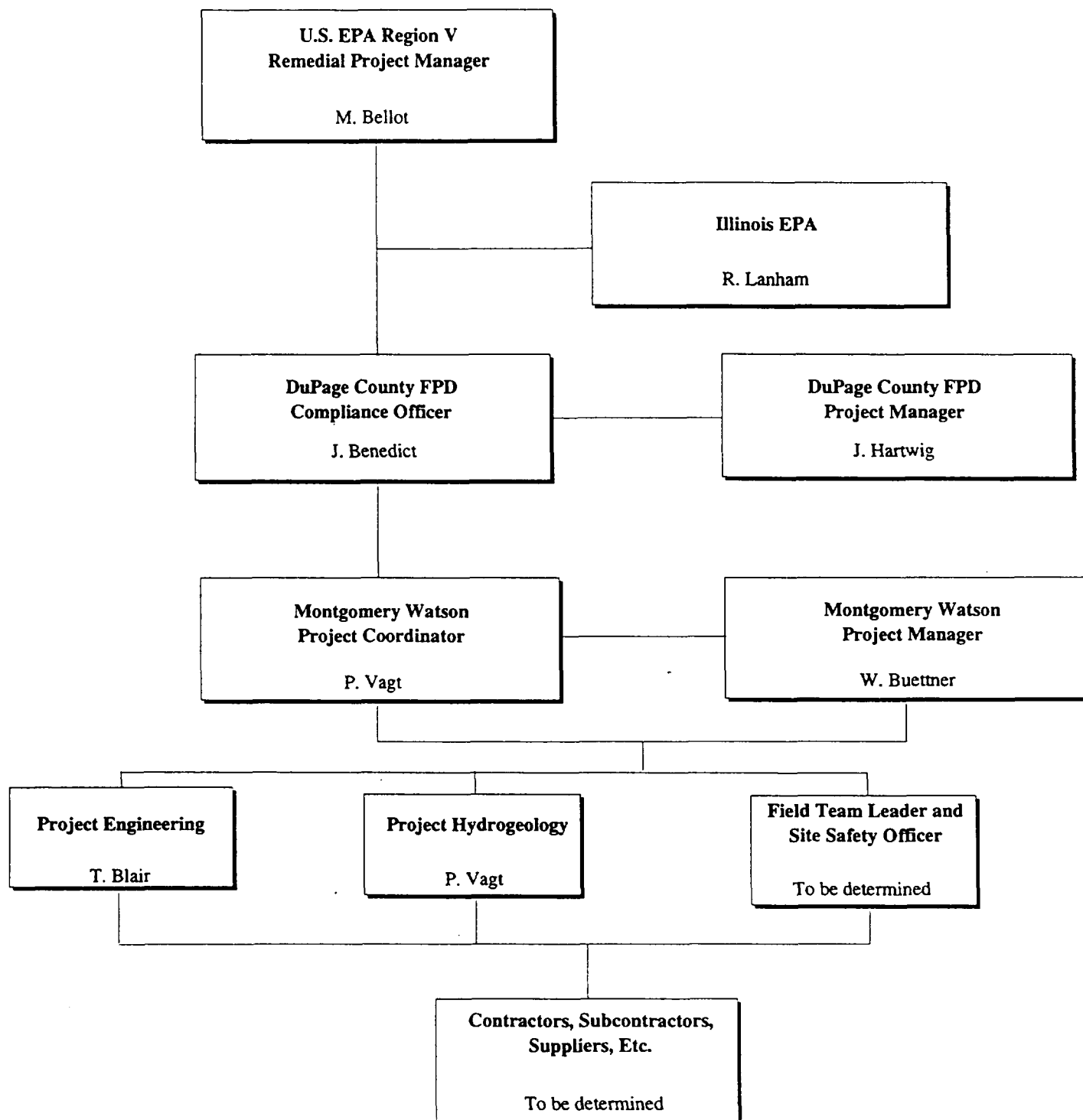


FIGURE 2

FIGURE 3

DUPAGE COUNTY LANDFILL/BLACKWELL FOREST PRESERVE FOREST PRESERVE DISTRICT OF DUPAGE COUNTY, ILLINOIS

CORRESPONDENCE LIST

1. Submissions to Respondent shall be addressed to:

- Mr. Joseph Benedict
Compliance Officer
Forest Preserve District of DuPage County
P.O. Box 2339
185 Spring Avenue
Glen Ellyn, Illinois 60138
(630) 942-6063 (Direct)
(630) 790-4919 (Fax)
(630) 738-2088 (cellular)

With copies to:

- Mr. Peter Vagt
Montgomery Watson
2100 Corporate Drive
Addison, Illinois 60101
(630) 691-5000
(630) 665-4629 (Home)
(630) 691-5020 (Direct)
(630) 691-5133 (Fax)
(630) 805-6594 (Cellular)

2. Submissions to U.S. EPA shall be addressed to:

- Michael Bellot
Remedial Project Manager
U.S. EPA - Region 5
77 West Jackson Boulevard, SR-6J
Chicago, Illinois 60604-3590
(312) 886-6399
(312) 886-4071 (Fax)

With copies to:

- Kurt Lindland
Assistant Regional Counsel
U.S. EPA - Region 5
77 West Jackson Boulevard, C-29A
Chicago, Illinois 60604-3590

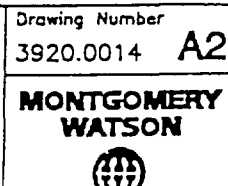
- Mr. Rick Lanham
Project Manager
NPL Unit
Remedial Project Management Section
Division of Remediation Management
Bureau of Land
Illinois Environmental Protection Agency
2200 Churchill Road
Springfield, Illinois 62794-9276
(217) 782-9881
(217) 782-3258 (Fax)

3. Additional Contacts:

- Mr. Jerry Hartwig
Project Engineer
Forest Preserve District of DuPage County
P.O. Box 2339
185 Spring Avenue
Glen Ellyn, Illinois 60138
(630) 790-4900 (Extension 6069)
(630) 790-4919 (Fax)
(630) 710-4547 (Cellular)
- Mr. Dean Free
Montgomery Watson
One Science Court
Madison, Wisconsin 53711
(608) 231-4747
(608) 231-4777 (Fax)
- Mr. Walter Buettner
Montgomery Watson
2100 Corporate Drive
Addison, Illinois 60101
(630) 691-5000
(630) 691-5133 (Fax)
- Mr. Jim Sheffler
Forest Preserve District of DuPage County
P.O. Box 2339
185 Spring Avenue
Glen Ellyn, Illinois 60138
(630) 790-4900
(630) 790-4919 (Fax)
(630) 710-4546 (Cellular)

DEWING







A



A

- A1 US. EPA Administrative Order by Consent with Statement of Work
- A2 May 22, 1996 U.S. EPA Approval Letter

A1

US. EPA ADMINISTRATIVE ORDER BY CONSENT WITH
STATEMENT OF WORK



UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION 5
77 WEST JACKSON BOULEVARD
CHICAGO, IL 60604-3590

final

MAR 01 1996

REPLY TO THE ATTENTION OF:

S-6J

CERTIFIED MAIL
RETURN RECEIPT REQUESTED

Mr. Richard L. Utt
Director of Government Services
Forest Preserve District of DuPage County
185 Spring Avenue
Glen Ellyn, Illinois 60137

Subject: Blackwell Landfill
DuPage County, Illinois

Dear Mr. Utt:

Enclosed is the Forest Preserve District of DuPage County's copy of the Administrative Order by Consent issued for this site pursuant to Sections 106(a), 107, and 122 of the Comprehensive Environmental Response, Compensation, and Liability Act of 1980, as amended, 42 U.S.C. § 9606, 9607, and 9622. Thank you for your cooperation in this matter.

If you have any questions regarding this Order, please contact Kurt Lindland, Assistant Regional Counsel, at (312)886-6831, or Duane Heaton, Remedial Project Manager, at (312)886-6399.

Sincerely yours,

William E. Muno
Director, Superfund Division

Enclosure

cc: State Agency Superfund Coordinator

ORDINANCE NO. 96-062

ORDINANCE APPROVING ADMINISTRATIVE ORDER BY CONSENT FOR THE DISTRICT TO PROVIDE PERFORMANCE OF RESPONSE ACTIONS AND REIMBURSEMENT OF RESPONSE COSTS INCURRED BY THE UNITED STATES IN CONNECTION WITH THE DUPAGE COUNTY LANDFILL/BLACKWELL FOREST PRESERVE PROPERTY LOCATED WITHIN THE BLACKWELL FOREST PRESERVE, IN SECTION 26, TOWNSHIP 39 NORTH, RANGE 9 EAST, DUPAGE COUNTY, ILLINOIS (THE "BLACKWELL LANDFILL SITE" OR THE "SITE")

WHEREAS, the Forest Preserve District of DuPage County, Illinois (hereinafter the "District"), is the owner of the Roy C. Blackwell Forest Preserve in Warrenville, Illinois; and

WHEREAS, from 1965 through 1973 the District as owner of and the Public Works Department of the County of DuPage as operator operated a municipal landfill on approximately 40 acres of land at the Roy C. Blackwell Forest Preserve; and

WHEREAS, a recreational hill was constructed through the use of sanitary landfill techniques known as Mt. Hoy, which hill was completed in 1973; and

WHEREAS, previously on July 6, 1989, the District by Resolution No. 89-234 authorized a good faith proposal to and negotiations with the USEPA with respect to an Administrative Order by Consent and to conduct a RI/FS at the Blackwell site; and

WHEREAS, the Forest Preserve District Landfill Committee has caused negotiations to be done between the District and the USEPA resulting in a new Administrative Order by Consent, which provides, among other things, that the Respondent is required to conduct response actions described herein to abate an imminent and substantial endangerment to the

public health, welfare or the environment that may be presented by the actual or threatened release of hazardous substances at or from the Site; and

WHEREAS, it is in the best interests of the District to approve the Administrative Order by Consent and authorize its execution on behalf of the District.

NOW, THEREFORE, BE IT ORDAINED by the President and Commissioners of the Forest Preserve District of DuPage County, Illinois:

A. That the District hereby approves the Administrative Order by Consent for the Blackwell Forest Preserve, a copy of which is attached hereto and made a part hereof.

B. The Director of Government Services of the District is authorized to execute and transmit the signed Administrative Order by Consent to the USEPA, a copy of which is attached hereto, on behalf of the District.

C. The Secretary of the District is authorized and directed to transmit a copy of this Ordinance to the Executive Director, Secretary, Finance Officer, Attorney and three copies to the Director of Government Services of the Forest Preserve District of DuPage County, respectively.

PASSED AND APPROVED by the President and Board of Commissioners of the Forest Preserve District of DuPage County, Illinois this 20th day of February, 1996.

Ayes: 18
Absent: 6
Vacant: 1

APPROVED:



President



Secretary

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION 5

IN THE MATTER OF:	)	Docket No. V-W- '96-C-341
)	
DuPage County Landfill/ Blackwell Forest Preserve)	)	ADMINISTRATIVE ORDER BY
DuPage County, Illinois	)	CONSENT PURSUANT TO
EPA ID: ILD980606305	)	SECTION 106 OF THE
	)	COMPREHENSIVE
Respondent:	)	ENVIRONMENTAL RESPONSE,
	)	COMPENSATION, AND
	)	LIABILITY ACT OF 1980,
Forest Preserve District	)	as amended, 42 U.S.C.
of DuPage County	)	§ 9606(a)
)	

I. JURISDICTION AND GENERAL PROVISIONS

This Administrative Order by Consent ("Consent Order") is entered voluntarily by the United States Environmental Protection Agency ("U.S. EPA" or "Agency") and the Forest Preserve District of DuPage County (Respondent). The Consent Order is issued pursuant to the authority vested in the President of the United States by Sections 106(a), 107 and 122 of the Comprehensive Environmental Response, Compensation, and Liability Act of 1980, as amended ("CERCLA"), 42 U.S.C. §§ 9606(a), 9607 and 9622. This authority has been delegated to the Administrator of the U.S. EPA by Executive Order No. 12580, January 23, 1987, 52 Federal Register 2923, and further delegated to the Regional Administrators by U.S. EPA Delegation Nos. 14-14-A, 14-14-C and 14-14-D, and further delegated to the Director, Superfund Division, Region 5.

This Consent Order provides for performance of response actions and reimbursement of response costs incurred by the United States in connection with the DuPage County Landfill/Blackwell Forest Preserve property located within the Blackwell Forest Preserve, in Section 26, Township 39 North, Range 9 East, DuPage County, Illinois (the "Blackwell Landfill Site" or the "Site"). This Consent Order requires the Respondent to conduct response actions

described herein to abate an imminent and substantial endangerment to the public health, welfare or the environment that may be presented by the actual or threatened release of hazardous substances at or from the Site.

A copy of this Consent Order will also be provided to the State of Illinois, which has been notified of the issuance of this Consent Order pursuant to Section 106(a) of CERCLA, 42 U.S.C. § 9606(a).

The Respondent's participation in this Consent Order shall not constitute an admission of liability for property damage or potential property damage at the site or of U.S. EPA's findings or determinations contained in this Consent Order except in a proceeding to enforce the terms of this Consent Order. The Respondent agrees to comply with and be bound by the terms of this Consent Order. The Respondent further agrees that it will not contest the basis or validity of this Consent Order or its terms.

II. PARTIES BOUND

This Consent Order applies to and is binding upon U.S. EPA, and upon the Respondent and the Respondent's heirs, receivers, trustees, successors and assigns. Any change in ownership or corporate status of the Respondent including, but not limited to, any transfer of assets or real or personal property shall not alter such Respondent's responsibilities under this Consent Order.

The Respondent shall ensure that its contractors, subcontractors, and representatives receive a copy of this Consent Order, and comply with this Consent Order. The Respondent shall be responsible for any noncompliance with this Consent Order.

III. FINDINGS OF FACT

Based on available information, including the Administrative Record in this matter, U.S. EPA hereby finds, and, for purposes of enforceability of the Consent Order, the Respondent stipulates that the factual statutory prerequisites under CERCLA necessary for issuance of this Consent Order only have been met. U.S. EPA's findings and this stipulation, for the purpose of this Order, are as follows:

1. The tract which was developed into the Blackwell Landfill consists of approximately 40 acres, and was purchased by the Forest Preserve District of DuPage County (FPD) in 1960.

2. Construction of the Blackwell Landfill was performed as a joint effort between the DuPage County Public Works Department (PWD) and the FPD. Under the terms of a July 1965 agreement, the PWD was to construct and operate the landfill under supervision by the FPD. In 1969, the FPD assumed responsibility for construction and operation of the landfill. The landfill was subsequently landscaped and used as a recreational amenity owned and operated by the FPD.

3. The Blackwell Landfill accepted approximately 1.5 million cubic yards of household refuse and light industrial waste from about 1965 through 1973. Some refuse may have been incorporated into the cover material.

4. Specific wastes known to be disposed of at the Blackwell Landfill Site include eight thousand tons of dry sludge from the Metropolitan Sanitary District of Greater Chicago, daily trash from the glass manufacturing facility of Owens-Illinois of St. Charles, Illinois, and disposal of plant trash from Kroehler Manufacturing of Naperville, Illinois. An estimated three to four tons of refuse per day were placed in the landfill.

5. The Blackwell Landfill was originally designed to consist of a series of approximately 1-acre clay-lined cells with a leachate collection system. Over time, modifications were made to the original design, including the addition of at least one cell used for disposal of construction debris, lack of the leachate collection system, and cells larger than 1 acre. Detailed as-built drawings are not known to exist for the site to document construction.

6. The "cap" material ranges in thickness from approximately 2 feet to 60 feet, but in addition to clay, it includes topsoil, silt fill, sand and gravel fill, gravel fill, and possibly some refuse.

7. The Blackwell Landfill Site was proposed for inclusion on the National Priorities List (NPL) in June 1988 pursuant to Section 105 of CERCLA, and was placed on the NPL in February 1990.

8. On September 25, 1989, U.S. EPA and the FPD entered into an Administrative Order by Consent, whereby the FPD agreed to conduct a Remedial Investigation (RI) and Feasibility Study (FS) for the Blackwell Landfill Site.

9. The RI was approved by U.S. EPA in December 1994. The FS was submitted to U.S. EPA in June 1995.

10. In 1982, gas vents were installed in the landfill to reduce natural gas buildup.

11. A network of groundwater monitoring wells was installed in and around the landfill in the early 1970's. During the 1980's, additional monitoring wells were added to provide pertinent information on both the glacial outwash aquifer and the bedrock aquifer.

12. The monitoring wells were sampled quarterly from 1983-1989,

and sampled again during the RI in 1990 and 1991 and in June 1995. Sampling results have shown that the concentration of eleven volatile organic compounds (VOCs) in monitoring wells downgradient of the Blackwell Landfill Site, but still on the forest preserve property, exceed Maximum Contaminant Levels (MCLs) allowed in public drinking water. Two wells near the boundary of the forest preserve property had sampling results that reached or exceeded a MCL during one sampling event; however, the detections were not repeated in the June 1995 sampling.

13. Monitoring wells downgradient of the Blackwell Landfill have shown the presence of the following hazardous substances migrating from the landfill: trichloroethene, tetrachloroethene, 1,2-dichloroethene, 1,1-dichloroethane, 1,2-dichloroethane, 1,2-dichloropropane, vinyl chloride, benzene, toluene, ethylbenzene, xylene, chlorobenzene, chloroethane, acetone, 2-butanone, 4-methyl-2-pentanone, bis(2-ethylhexyl)phthalate, and carbon disulfide.

14. A glacial outwash aquifer begins beneath the Blackwell Landfill Site.

15. The direction of groundwater flow in the glacial outwash aquifer is west to southwest from the landfill. Groundwater flow from Spring Brook is east toward the landfill. Between the landfill and Spring Brook, groundwater flow in the outwash aquifer is to the south.

16. Spring Brook, located approximately 1,000 feet downgradient of the landfill, is the boundary of the Blackwell Forest Preserve, with the exception of one area where there are two residences.

17. The horizontal hydraulic gradient is flattened in the outwash aquifer between the landfill and Spring Brook, strengthening the vertical gradient between the outwash aquifer and the bedrock

aquifer.

18. An aquitard between the glacial outwash aquifer and the underlying Silurian dolomite bedrock is very thin or locally absent in areas downgradient of the landfill.

19. Several contaminants which are present in the landfill leachate were detected at levels below MCLs in 15 of 51 private wells in the residential area downgradient of the Site.

20. The private wells which had detectable contaminant levels draw groundwater from the bedrock aquifer.

21. The direction of groundwater flow in the bedrock aquifer is toward the southwest.

22. Spring Brook is not a hydrological barrier to groundwater flow.

23. The three contaminants found in the private wells were among the five contaminants found in the bedrock monitoring wells downgradient of the Blackwell Landfill Site.

24. The Silurian dolomite bedrock aquifer is a major source of drinking water in the area surrounding the Blackwell Landfill Site.

25. The Blackwell Landfill Site is within the recharge zone of the Warrenville public water supply.

26. Sand Pond, located just south of the landfill, was closed to public swimming by the FPD in 1984 as a precautionary measure. Low levels of contaminants were found in the pond sediments during the RI in 1989. There is no plan by the FPD to re-open Sand Pond for swimming.

27. Leachate seeps were mitigated by the FPD in 1980 by regrading and redirecting runoff and by utilizing erosion control measures. The FPD has been pumping leachate from collection manholes and trucking it to the Wheaton wastewater treatment plant for treatment and disposal.

28. The volume of leachate within the landfill is estimated to be 53-70 million gallons, and the rate of leachate generated is estimated to average 9,500-14,000 gallons per day.

29. One leachate sample collected from the landfill during the RI contained trichloroethene (TCE) at a level exceeding the value for the Toxicity Characteristic Leaching Procedure (TCLP) as established pursuant to the Resource Conservation and Recovery Act (RCRA). Also, because dilutions were necessary during lab analysis, the Contract Required Detection Limit for several organic compounds exceeded the RCRA TCLP regulatory limits. Thus, other compounds could have also exceeded the RCRA TCLP regulatory limit.

30. Vinyl chloride, which is a degradation product of TCE and some of the other VOCs associated with the Blackwell Landfill Site, has a MCL that is lower than the MCL of the parent compounds.

IV. CONCLUSIONS OF LAW AND DETERMINATIONS

Based on the Findings of Fact set forth above, and the Administrative Record supporting these response actions, U.S. EPA has determined that:

1. The Blackwell Landfill Site is a "facility" as defined by Section 101(9) of CERCLA, 42 U.S.C. § 9601(9).

2. Trichloroethene, tetrachloroethene, 1,2-dichloroethene, 1,1-dichloroethane, 1,2-dichloroethane, 1,1,1-dichloroethane, 1,2-

dichloropropane, vinyl chloride, benzene, toluene, ethylbenzene, xylene, chlorobenzene, chloroethane, acetone, 2-butanone, 4-methyl-2-pentanone, bis(2-ethylhexyl)phthalate, and carbon disulfide are "hazardous substances" as defined by Section 101(14) of CERCLA, 42 U.S.C. § 9601(14).

3. Respondent FPD is a "person" as defined by Section 101(21) of CERCLA, 42 U.S.C. § 9601(21).

4. Respondent FPD is the present "owner" and "operator" of the Blackwell Landfill Site, as defined by Section 101(20) of CERCLA, 42 U.S.C. § 9601(20). Respondent FPD is either a person who at the time of disposal of any hazardous substances owned or operated the Blackwell Landfill Site, or who arranged for disposal or transport for disposal of hazardous substances at the Blackwell Landfill Site. The Respondent therefore may be liable under Section 107(a) of CERCLA, 42 U.S.C. § 9607(a).

5. The conditions described in the Findings of Fact above constitute an actual or threatened "release" of a hazardous substance from the facility into the "environment" as defined by Sections 101(8) and (22) of CERCLA, 42 U.S.C. §§ 9601(8) and (22).

6. The conditions present at the Site constitute a threat to public health, welfare, or the environment based upon the factors set forth in Section 300.415(b)(2) of the National Oil and Hazardous Substances Pollution Contingency Plan, as amended ("NCP"), 40 CFR § 300.415(b)(2). These factors include, but are not limited to, the following:

- a. actual or potential exposure to nearby human populations, animals, or the food chain from hazardous substances, pollutants or contaminants; this factor is present at the Site due to the existence of hazardous substances within the landfill, the landfill leachate, and the groundwater.

b. actual or potential contamination of drinking water supplies or sensitive ecosystems; this factor is present at the Site due to the existence of hazardous substances in groundwater monitoring wells downgradient from the Blackwell Landfill Site in excess of MCLs, and detectable levels of hazardous substances in private residential wells downgradient from the Blackwell Landfill Site. Additionally, groundwater is a source of public drinking water in the area around the Blackwell Landfill.

c. weather conditions that may cause hazardous substances or pollutants or contaminants to migrate or be released; this factor is present at the Site due to the existence of hazardous substances in the waste and leachate within the landfill which could be further mobilized by percolation of rainwater and/or snowmelt through the landfill. Additionally, erosion of the landfill surface could increase percolation through the landfill, thus further mobilizing contaminants in the landfill.

7. The actual or threatened release of hazardous substances from the Site may present an imminent and substantial endangerment to the public health, welfare, or the environment within the meaning of Section 106(a) of CERCLA, 42 U.S.C. § 9606(a).

8. The response actions required by this Consent Order, if properly performed, are consistent with the NCP, 40 CFR Part 300, as amended, and with CERCLA, and are reasonable and necessary to protect the public health, welfare, and the environment.

V. ORDER

Based upon the foregoing Findings of Fact, Conclusions of Law and Determinations, and the Administrative Record for the Blackwell

Landfill Site, it is hereby ordered and agreed that the Respondent shall comply with the following provisions, including but not limited to all documents attached to or incorporated into this Consent Order, and perform the following actions:

1. Designation of Contractor, Project Coordinator, and Remedial Project Manager

The Respondent shall perform the actions required by this Consent Order itself or retain a contractor to undertake and complete the requirements of this Consent Order. The Respondent shall notify U.S. EPA of Respondent's qualifications or the name and qualifications of such contractor, whichever is applicable, within 20 business days of the effective date of this Consent Order. The Respondent shall also notify U.S. EPA of the name and qualifications of any other contractors or subcontractors retained to perform work under this Consent Order at least 5 business days prior to commencement of such work. U.S. EPA retains the right to disapprove of the Respondent or any of the contractors and/or subcontractors retained by the Respondent. If U.S. EPA disapproves a selected contractor, the Respondent shall retain a different contractor within 2 business days following U.S. EPA's disapproval, and shall notify U.S. EPA of that contractor's name and qualifications within 5 business days of U.S. EPA's disapproval.

Within 5 business days after the effective date of this Consent Order, the Respondent shall designate a Project Coordinator who shall be responsible for administration of all the Respondent's actions required by this Consent Order. The Respondent shall submit the designated coordinator's name, address, telephone number, and qualifications to U.S. EPA. U.S. EPA retains the right to disapprove of any Project Coordinator named by the Respondent. If U.S. EPA disapproves a selected Project Coordinator, Respondent shall retain a different Project Coordinator within 3 business days following U.S. EPA's disapproval and shall notify U.S. EPA of that

person's name and qualifications within 5 business days of U.S. EPA's disapproval. Receipt by Respondent's Project Coordinator of any notice or communication from U.S. EPA relating to this Consent Order shall constitute receipt by the Respondent.

The U.S. EPA has designated Duane Heaton of the Remedial Response Section #4, Region 5, as its Remedial Project Manager (RPM). The Respondent shall direct all submissions required by this Consent Order to the RPM at 77 West Jackson Boulevard, SR-6J, Chicago, Illinois 60604-3590, by certified or express mail. The Respondent shall also send a copy of all submissions to Kurt Lindland, Assistant Regional Counsel, 77 West Jackson Boulevard, C-29A, Chicago, Illinois 60604-3590. Respondent is encouraged to make submissions to U.S. EPA on recycled paper (which includes significant postconsumer waste paper content where possible) and using two-sided copies.

U.S. EPA and the Respondent shall have the right, subject to the immediately preceding paragraphs, to change their designated RPM or Project Coordinator. U.S. EPA shall notify the Respondent, and the Respondent shall notify U.S. EPA, as early as possible before such a change is made, but in no case less than 24 hours before such a change. The initial notification may be made orally but it shall be promptly followed by a written notice within two business days of oral notification.

2. Work to Be Performed

The Respondent shall perform, at a minimum, the following response actions which are specified in the Statement of Work ("SOW"), attached hereto as Appendix A:

- a. conduct soil borings to delineate any areas of the landfill which do not have a minimum of two feet of low permeability cover material;

b. based on the findings of soil borings, repair the cap as necessary to ensure that all areas of the landfill are covered with a minimum of two feet of low permeability material.

c. ensure that all areas of the landfill are sloped sufficiently to enhance drainage from the surface of the landfill;

d. install leachate extraction wells to adequately remove leachate from the interior of the landfill to reduce leachate being released into the underlying groundwater to an acceptable level, and to vent landfill gas;

e. install a collection system to convey the extracted leachate to a central collection tank for storage pending treatment and disposal;

f. treat and dispose of the stored leachate at a NPDES- or RCRA-permitted facility, as appropriate;

g. continue to maintain and utilize the 25 existing gas vents to reduce pressure buildup within the landfill, thus further reducing the volume of leachate being released into the underlying groundwater;

h. make inoperable an existing subsurface leachate drain into an adjacent area of the forest preserve, and connect the existing leachate collection systems to the leachate collection and disposal system being installed pursuant to this Consent Order;

i. provide as-built plans of storm water drainage from the top of the landfill, and make any necessary modifications to ensure that contaminants from within the landfill are not inadvertently being drained from the landfill to nearby areas

of the forest preserve;

j. provide evidence that trees on the landfill are not in an area where root penetration could allow percolation of rainwater through refuse within the landfill;

k. reassess the adequacy of the number and integrity of existing monitoring wells to ensure that contaminants in the groundwater will be detected in all aquifers in downgradient areas between the landfill and the forest preserve boundary;

l. conduct quarterly monitoring of the monitoring wells on the forest preserve property to ensure that contaminant levels do not increase to a level that could jeopardize either human health or the environment. Monitoring shall begin upon approval by U.S. EPA of the Design Work Plan and continue until a Record of Decision is issued by U.S. EPA and a Consent Decree or Unilateral Administrative Order is in effect to address long-term maintenance and monitoring.

m. maintain all components to ensure the continued operation of the systems to prevent contamination of groundwater from exceeding Maximum Contaminant Levels at the forest preserve boundary;

3. Design.

a. Within 45 days after U.S. EPA's approval of the Contractor and Project Coordinator pursuant to Section V.1., the Respondent shall submit to U.S. EPA and the IEPA a work plan for the design of the response actions at the Site ("Design Work Plan"). The Design Work Plan shall provide for design of the response actions set forth in Section V.2. and the SOW for achievement of the Performance Standards and other requirements set forth in this Consent Order and/or the SOW.

Upon its approval by U.S. EPA, the Design Work Plan shall be incorporated into and become enforceable under this Consent Order. Within 30 days after U.S. EPA's approval of the Design Work Plan, the Respondent shall submit to U.S. EPA and the State a Health and Safety Plan for field design activities which conforms to the applicable Occupational Safety and Health Administration and U.S. EPA requirements including, but not limited to, 29 C.F.R. § 1910.120.

b. The Design Work Plan shall include plans and schedules for implementation of all pre-design and design tasks identified in the SOW, including, but not limited to, plans and schedules for the completion of (1) design sampling and analysis plan (including, but not limited to, a Design Quality Assurance Plan (DQAPP) in accordance with Section V.8. (Quality Assurance and Sampling); (2) all pre-design field work; (3) a Preliminary Design submittal; (4) a Pre-final/Final Design submittal; (5) a Construction Quality Assurance Plan.

c. Upon approval of the Design Work Plan by U.S. EPA, after a reasonable opportunity for review and comment by the State, and submittal of the Health and Safety Plan for all field activities to U.S. EPA and the State, the Respondent shall implement the Design Work Plan. The Respondent shall submit to U.S. EPA and the State all plans, submittals and other deliverables required under the approved Design Work Plan in accordance with the approved schedule for review and approval pursuant to Section VI (U.S. EPA Approval of Plans and Other Submissions). Unless otherwise directed by U.S. EPA, the Respondent shall not commence further design activities at the Site prior to approval of the Design Work Plan.

d. The Preliminary Design submittal shall include, at a minimum, the following: (1) design criteria; (2) results of

additional field sampling and pre-design work; (3) project delivery strategy; (4) preliminary plans, drawings and sketches; (5) required specifications in outline form; and (6) preliminary construction schedule.

e. The Intermediate Design submittal, if required by U.S. EPA or if independently submitted by the Respondent, shall be a continuation and expansion of the Preliminary Design. Any value engineering proposals must be identified and evaluated during this review.

f. The Pre-final/Final Design submittal shall include, at a minimum, the following: (1) final plans and specifications; (2) Operation and Maintenance Plan; (3) Construction Quality Assurance Project Plan (CQAPP); (4) Field Sampling Plan (directed at measuring progress towards meeting Performance Standards); (5) Health and Safety Plan for response action field activities which conforms to the applicable Occupational Safety and Health Administration and U.S. EPA requirements including, but not limited to, 29 CFR 1910.120; and (5) Contingency Plan. The CQAPP, which shall detail the approach to quality assurance during construction activities at the Site, shall specify a quality assurance official ("QA Official"), independent of the Project Coordinator, to conduct a quality assurance program during the construction phase of the project. The Pre-final/Final Design shall also include the following: (1) the schedule for completion of the response actions; (2) method for selection of the contractor; (3) methodology for implementation for the CQAPP; (4) a groundwater monitoring plan; (5) methods for satisfying permitting requirements; (6) methodology for implementation of the Operation and Maintenance Plan; (7) methodology for implementation of the Contingency Plan; (8) construction quality control plan (by constructor); (9) procedures and plans for the decontamination of equipment and the disposal of

contaminated materials; and (10) a schedule for implementation of all response action tasks.

4. The Respondent shall continue to implement the response actions and O&M set forth above until U.S. EPA issues a Record of Decision and entry of a Consent Decree or Unilateral Administrative Order for implementation of the response actions set forth above and in the SOW, and any other response actions U.S. EPA determines are necessary to respond to the release or threat of release of hazardous substances from the Site.

5. Modification of the SOW or Related Work Plans.

a. If U.S. EPA determines that modification to the work specified in the SOW and/or in work plans developed pursuant to the SOW is necessary to achieve and maintain the Performance Standards or to carry out and maintain the effectiveness of the response actions, U.S. EPA may require that such modification be incorporated in the SOW and/or such work plans. Provided, however, that a modification may only be required pursuant to this Paragraph to the extent that it is consistent with Section V.2. of this Consent Order.

b. If the Respondent objects to any modification determined by U.S. EPA to be necessary pursuant to this Paragraph, it may seek dispute resolution pursuant to Section VIII (Dispute Resolution). The SOW and/or related work plans shall be modified in accordance with final resolution of the dispute.

c. The Respondent shall implement any work required by any modifications incorporated in the SOW and/or in work plans developed pursuant to the SOW in accordance with this Paragraph.

d. Nothing in this Paragraph shall be construed to limit

U.S. EPA's authority to require performance of further response actions as otherwise provided in Section V.10. of this Consent Order.

6. The Respondent acknowledges and agrees that nothing in this Consent Order, the SOW, or the Design Work Plan constitutes a warranty or representation of any kind by the U.S. EPA that compliance with the work requirements set forth in the SOW or the Design Work Plan will achieve the Performance Standards.

7. The Respondent shall, prior to any off-Site shipment of Waste Material from the Site to an out-of-state waste management facility, provide written notification to the appropriate state environmental official in the receiving facility's state and to the U.S. EPA RPM of such shipment of Waste Material. However, this notification requirement shall not apply to any off-Site shipments when the total volume of all such shipments will not exceed 10 cubic yards.

a. The Respondent shall include in the written notification the following information, where available: (1) the name and location of the facility to which the Waste Material are to be shipped; (2) the type and quantity of the Waste Material to be shipped; (3) the expected schedule for the shipment of the Waste Material; and (4) the method of transportation. The Respondent shall notify the state in which the planned receiving facility is located of major changes in the shipment plan, such as a decision to ship the Waste Material to another facility within the same state, or to a facility in another state.

b. The identity of the receiving facility and state will be determined by the Respondent following the award of the contract for construction of the response actions. The Respondent shall provide the information required by Section

V.7.a as soon as practicable after the award of the contract and before the Waste Material is actually shipped.

8. Quality Assurance and Sampling

All sampling and analyses performed pursuant to this Consent Order shall conform to U.S. EPA direction, approval, and guidance regarding sampling, quality assurance/quality control (QA/QC), data validation, and chain of custody procedures. The Respondent shall ensure that the laboratory used to perform the analyses participates in a QA/QC program that complies with U.S. EPA guidance.

Upon request by U.S. EPA, the Respondent shall have such a laboratory analyze samples submitted by U.S. EPA for quality assurance monitoring. The Respondent shall provide to U.S. EPA the quality assurance/quality control procedures followed by all sampling teams and laboratories performing data collection and/or analysis. The Respondent shall also ensure provision of analytical tracking information consistent with, at a minimum, OSWER Directive No. 9240.0-2B, "Extending the Tracking of Analytical Services to PRP-Lead Superfund Sites."

Upon request by U.S. EPA, the Respondent shall allow U.S. EPA or its authorized representatives to take split and/or duplicate samples of any samples collected by the Respondent or its contractors or agents while performing work under this Consent Order. The Respondent shall notify U.S. EPA not less than 5 business days in advance of any sample collection activity. U.S. EPA shall have the right to take any additional samples that it deems necessary.

9. Reporting

The Respondent shall submit a monthly written progress report to

U.S. EPA concerning actions undertaken pursuant to this Consent Order, beginning 30 calendar days after the effective date of this Consent Order, until termination of this Consent Order, unless otherwise directed in writing by the RPM. These reports shall describe all significant developments during the preceding period, including the work performed and any problems encountered, analytical data received during the reporting period, and developments anticipated during the next reporting period, including a schedule of work to be performed, anticipated problems, and planned resolutions of past or anticipated problems.

Any Respondent that owns any portion of the Site shall, at least 30 days prior to the conveyance of any interest in real property at the Site, give written notice of this Consent Order to the transferee and written notice of the proposed conveyance to U.S. EPA and the State. The notice to U.S. EPA and the State shall include the name and address of the transferee. The party conveying such an interest shall require that the transferee will provide access as described in Section V.11 (Access to Property and Information).

10. Additional Work

In the event that the U.S. EPA or the Respondent determine that additional work, including design, sampling, or response actions, is necessary to accomplish the Performance Standards, notification of such additional work shall be provided to the other parties in writing. Any additional work which Respondent determines to be necessary shall be subject to U.S. EPA's written approval prior to commencement of the additional work. Respondent shall complete, in accordance with standards, specifications, and schedules U.S. EPA has approved, any additional work Respondent has proposed, and which U.S. EPA has approved in writing or that U.S. EPA has determined to be necessary, and has provided written notice of pursuant to this Paragraph.

11. Access to Property and Information

The Respondent shall provide or obtain access to the Site and off-site areas to which access is necessary to implement this Consent Order, and shall provide access to all records and documentation related to the conditions at the Site and the actions conducted pursuant to this Consent Order, provided however, that Respondent does not waive the protection of attorney client privilege or the attorney work product. Such access shall be provided to U.S. EPA employees, contractors, agents, consultants, designees, representatives, and State of Illinois representatives. These individuals shall be permitted to move freely at the Site and appropriate off-site areas to which the Respondent has access in order to conduct actions which U.S. EPA determines to be necessary. The Respondent shall submit to U.S. EPA, upon request/receipt, the results of all sampling or tests and all other data generated by the Respondent or its contractors, or on the Respondent's behalf during implementation of this Consent Order.

Where work/action under this Consent Order is to be performed in areas owned by or in possession of someone other than the Respondent, the Respondent shall use its best efforts to obtain all necessary access agreements within 14 calendar days after the effective date of this Consent Order, or as otherwise specified in writing by the RPM. The Respondent shall notify U.S. EPA within 2 business days if, after using its best efforts, it is unable to obtain such agreements. The Respondent shall describe in writing its efforts to obtain access. U.S. EPA may, in its discretion, then assist the Respondent in gaining access, to the extent necessary to effectuate the response actions described herein, using such means as U.S. EPA deems appropriate. The Respondent shall reimburse U.S. EPA for all costs and attorneys fees incurred by the United States in obtaining such access.

12. Record Retention, Documentation, Availability of Information

The Respondent shall preserve all documents and information, in its possession or the possession of its contractors, subcontractors or representatives, relating to work performed under this Consent Order, or relating to the hazardous substances found on or released from the Site, for six years following completion of the response actions required by this Consent Order. At the end of this six year period and at least 60 calendar days before any document or information is destroyed, the Respondent shall notify U.S. EPA that such documents and information are available to U.S. EPA for inspection, and upon request, shall provide the originals or copies of such documents and information to U.S. EPA. In addition, the Respondent shall provide copies of any such non-privileged documents and information retained under this Section at any time before expiration of the six year period at the written request of U.S. EPA.

If the Respondent asserts a privilege in lieu of providing documents, it shall provide U.S. EPA with the following: (1) the title of the document, record, or information; (2) the date of the document, record, or information; (3) the name and title of the author of the document, record, or information; (4) the name and title of each addressee and recipient; (5) a description of the contents of the document, record, or information; and (6) the privilege asserted by Respondent. However, no documents, reports, or other information created or generated pursuant to the requirements of this Consent Order shall be withheld on the grounds that they are privileged.

13. Compliance With Other Laws

The Respondent shall perform all activities required pursuant to this Consent Order in accordance with all the requirements of all federal and state laws and regulations. U.S. EPA has determined

that the activities contemplated by this Consent Order are consistent with the National Contingency Plan ("NCP").

Except as provided in Section 121(e) of CERCLA and the NCP, no permit shall be required for any portion of the activities conducted entirely on-site. Where any portion of the activities requires a federal or state permit or approval, the Respondent shall submit timely applications and take all other actions necessary to obtain and to comply with all such permits or approvals.

This Consent Order is not, and shall not be construed to be, a permit issued pursuant to any federal or state statute or regulation.

14. Emergency Response and Notification of Releases

If any incident, or change in Site conditions, during the activities conducted pursuant to this Consent Order causes or threatens to cause an additional release of hazardous substances from the Site or an endangerment to the public health, welfare, or the environment, the Respondent shall immediately take all appropriate action to prevent, abate or minimize such release or endangerment caused or threatened by the release. The Respondent shall also immediately notify the RPM or, in the event of his/her unavailability, shall notify the Regional Duty Officer, Emergency Response Branch, Region 5 at (312) 353-2318, of the incident or Site conditions. If the Respondent fails to respond, U.S. EPA may respond to the release or endangerment and reserves the right to recover costs associated with that response.

The Respondent shall submit a written report to U.S. EPA within 7 business days after each release, setting forth the events that occurred and the measures taken or to be taken to mitigate any release or endangerment caused or threatened by the release and to

prevent the reoccurrence of such a release. The Respondent shall also comply with any other notification requirements, including those in CERCLA Section 103, 42 U.S.C. § 9603, and Section 304 of the Emergency Planning and Community Right-To-Know Act, 42 U.S.C. § 11004.

VI. U.S. EPA APPROVAL OF PLANS AND OTHER SUBMISSIONS

1. After review of any plan, report or other item which is required to be submitted for approval pursuant to this Consent Order, U.S. EPA, after reasonable opportunity for review and comment by the State, shall: (a) approve, in whole or in part, the submission; (b) approve the submission upon specified conditions; (c) modify the submission to cure the deficiencies; (d) disapprove, in whole or in part, the submission, directing that the Respondent modify the submission; or (e) any combination of the above. However, U.S. EPA shall not modify a submission without first providing the Respondent at least one notice of deficiency and an opportunity to cure within 30 days, except where to do so would cause serious disruption to implementation of the response actions set forth under Section V.2 (Work to be Performed) or where previous submission(s) have been disapproved due to material defects and the deficiencies in the submission under consideration indicate a bad faith lack of effort to submit an acceptable deliverable.

2. In the event of approval, approval upon conditions, or modification by U.S. EPA, pursuant to Section VI.1.(a), (b), or (c), the Respondent shall proceed to take any action required by the plan, report, or other item, as approved or modified by U.S. EPA subject only to its right to invoke the Dispute Resolution procedures set forth in Section IX (Dispute Resolution) with respect to the modifications or conditions made by U.S. EPA. In the event that U.S. EPA modifies the submission to cure the

deficiencies pursuant to Section VI.1.(c) and the submission has a material defect, U.S. EPA retains its right to seek penalties, as provided in Section XI (Stipulated and Statutory Penalties).

3. a. Upon receipt of a notice of disapproval pursuant to Section VI.1.(d), the Respondent shall, within 30 days or such longer time as specified by U.S. EPA in such notice, correct the deficiencies and resubmit the plan, report, or other item for approval. Any penalties applicable to the submission, as provided in Section XI, shall accrue during the 30-day period or otherwise specified period but shall not be payable unless the resubmission is disapproved or modified due to a material defect as provided in Sections VI.4. and VI.5.

b. Notwithstanding the receipt of a notice of disapproval pursuant to Section VI.1.(d), the Respondent shall proceed, at the direction of U.S. EPA, to take any action required by any non-deficient portion of the submission. Implementation of any non-deficient portion of a submission shall not relieve Respondent of any liability for stipulated penalties under Section XI (Stipulated and Statutory Penalties).

4. In the event that a resubmitted plan, report or other item, or portion thereof, is disapproved by U.S. EPA, U.S. EPA may again require the Respondent to correct the deficiencies, in accordance with Sections VI.1., VI.2., or VI.3. U.S. EPA also retains the right to modify or develop the plan, report or other item. The Respondent shall implement any such plan, report, or item as modified or developed by U.S. EPA, subject only to its right to invoke the procedures set forth in Section IX (Dispute Resolution).

5. If upon resubmission, a plan, report, or item is disapproved or modified by U.S. EPA due to a material defect, the Respondent shall be deemed to have failed to submit such plan, report, or item timely and adequately unless the Respondent invokes the dispute

resolution procedures set forth in Section IX (Dispute Resolution) and U.S. EPA's action is overturned pursuant to that Section. The provisions of Section IX (Dispute Resolution) and Section XI (Stipulated and Statutory Penalties) shall govern the implementation of the Work and accrual and payment of any stipulated penalties during Dispute Resolution. If U.S. EPA's disapproval or modification is upheld, stipulated penalties shall accrue for such violation from the date on which the initial submission was originally required, as provided in Section XI.

6. All plans, reports, and other items required to be submitted to U.S. EPA under this Consent Order shall, upon approval or modification by U.S. EPA, be enforceable under this Consent Order. In the event U.S. EPA approves or modifies a portion of a plan, report, or other item required to be submitted to U.S. EPA under this Consent Order, the approved or modified portion shall be enforceable under this Consent Order.

VII. AUTHORITY OF THE U.S. EPA REMEDIAL PROJECT MANAGER

The RPM shall be responsible for overseeing the implementation of this Consent Order. The RPM shall have the authority vested in an RPM by the NCP, including the authority to halt, conduct, or direct any activities required by this Consent Order, or to direct any other response action undertaken by U.S. EPA or the Respondent at the Site. Absence of the RPM from the Blackwell Landfill Site shall not be cause for stoppage of work unless specifically directed by the RPM.

VIII. REIMBURSEMENT OF COSTS

The Respondent shall pay all oversight costs of the United States related to the Blackwell Landfill Site that are not inconsistent

with the NCP. In addition, U.S. EPA will send the Respondent a bill for "oversight costs" on an annual basis. "Oversight costs" are all costs, including, but not limited to, direct and indirect costs, that the United States incurs in reviewing or developing plans, reports and other items pursuant to this Consent Order.

The Respondent shall, within 30 calendar days of receipt of a bill, remit a Forest Preserve District check for the amount of the bill made payable to the "Hazardous Substance Superfund," to the following address:

U.S. Environmental Protection Agency
Superfund Accounting
P.O. Box 70753
Chicago, Illinois 60673

The Respondent shall simultaneously transmit a copy of the check to the Director, Superfund Division, U.S. EPA Region 5, 77 West Jackson Blvd., Chicago, Illinois, 60604-3590. Payments shall be designated as "Response Costs - DuPage County Landfill/Blackwell Forest Preserve Site" and shall reference the payor's name and address, the EPA site identification number (ILD980606305), and the docket number of this Consent Order.

In the event that any payment is not made within the deadlines described above, the Respondent shall pay interest on the unpaid balance. Interest is established at the rate specified in Section 107(a) of CERCLA, 42 U.S.C. § 9607(a). The interest shall begin to accrue on the date of the Respondent's receipt of the bill. Interest shall accrue at the rate specified through the date of the payment. Payments of interest made under this paragraph shall be in addition to such other remedies or sanctions available to the United States by virtue of the Respondent's failure to make timely payments under this Section.

The Respondent may dispute all or part of a bill for Oversight costs submitted under this Consent Order, if the Respondent alleges that U.S. EPA has made an accounting error, or if the Respondent alleges that a cost item is inconsistent with the NCP.

If any dispute over costs is resolved before payment is due, the amount due will be adjusted as necessary. If the dispute is not resolved before payment is due, the Respondent shall pay the full amount of the uncontested costs into the Hazardous Substance Fund as specified above on or before the due date. Within the same time period, the Respondent shall pay the full amount of the contested costs into an interest-bearing escrow account. The Respondent shall simultaneously transmit a copy of both checks to the RPM. The Respondent shall ensure that the prevailing party or parties in the dispute shall receive the amount upon which they prevailed from the escrow funds plus interest within 20 calendar days after the dispute is resolved.

IX. DISPUTE RESOLUTION

The parties to this Consent Order shall attempt to resolve, expeditiously and informally, any disagreements concerning this Consent Order.

If the Respondent objects to any U.S. EPA action taken pursuant to this Consent Order, including billings for response costs, the Respondent shall notify U.S. EPA in writing of its objection within 10 calendar days of such action, unless the objections have been informally resolved. This written notice shall include a statement of the issues in dispute, the relevant facts upon which the dispute is based, all factual data, analysis or opinion supporting the Respondent's position, and all supporting documentation on which the Respondent's rely (hereinafter the "Statement of Position").

U.S. EPA and the Respondent shall within 15 calendar days of U.S. EPA's receipt of the Respondent's Statement of Position, attempt to resolve the dispute through formal negotiations (Negotiation Period). The Negotiation Period may be extended at the sole discretion of U.S. EPA. U.S. EPA's decision regarding an extension of the Negotiation Period shall not constitute a U.S. EPA action subject to dispute resolution or a final Agency action giving rise to judicial review.

An administrative record of any dispute under this Section shall be maintained by U.S. EPA. The record shall include the written notification of such dispute, and the Statement of Position served pursuant to the preceding paragraph.

Any agreement reached by the parties pursuant to this Section shall be in writing, signed by all parties, and shall upon the signature by the parties be incorporated into and become an enforceable element of this Consent Order. If the parties are unable to reach an agreement within the Negotiation Period, U.S. EPA will issue a written decision on the dispute to the Respondent. The decision of U.S. EPA shall be incorporated into and become an enforceable element of this Order upon Respondent's receipt of the U.S. EPA decision regarding the dispute.

The Respondent's obligations under this Consent Order shall not be tolled by submission of any objection for dispute resolution under this Section. Following resolution of the dispute, as provided by this Section, the Respondent shall fulfill the requirement that was the subject of the dispute in accordance with the agreement reached or with U.S. EPA's decision, whichever occurs. No U.S. EPA decision made pursuant to this Section shall constitute a final Agency action giving rise to judicial review.

X. FORCE MAJEURE

The Respondent agrees to perform all requirements under this Consent Order within the time limits established under this Consent Order, unless the performance is delayed by a force majeure. For purposes of this Consent Order, a force majeure is defined as any event arising from causes beyond the control of Respondent or of any entity controlled by the Respondent, including but not limited to their contractors and subcontractors, that delays or prevents performance of any obligation under this Consent Order despite Respondent's best efforts to fulfill the obligation. Force majeure does not include financial inability to complete the work or increased cost of performance.

The Respondent shall notify U.S. EPA orally within 24 hours after the Respondent becomes aware of any event that the Respondent contends constitutes a force majeure, and in writing within 7 calendar days after the event or Respondent becomes aware of any events which constitute a force majeure. Such notice shall: identify the event causing the delay or anticipated delay; estimate the anticipated length of delay, including necessary demobilization and re-mobilization; state the measures taken or to be taken to minimize the delay; and estimate the timetable for implementation of the measures. The Respondent shall take all reasonable measures to avoid and minimize the delay. Failure to comply with the notice provision of this Section shall be grounds for U.S. EPA to deny the Respondent an extension of time for performance/waive any claim of force majeure by the Respondent. The Respondent shall have the burden of demonstrating by a preponderance of the evidence that the event is a force majeure, that the delay is warranted under the circumstances, and that best efforts were exercised to avoid and mitigate the effects of the delay.

If U.S. EPA determines a delay in performance of a requirement under this Consent Order is or was attributable to a force majeure,

the time period for performance of that requirement shall be extended as deemed necessary by U.S. EPA. Such an extension shall not alter the Respondent's obligation to perform or complete other tasks required by this Consent Order which are not directly affected by the force majeure.

XI. STIPULATED AND STATUTORY PENALTIES

For each calendar day, or portion thereof, that the Respondent fails to fully perform any requirement of this Consent Order in accordance with the schedule established pursuant to this Consent Order, the Respondent shall be liable as follows:

a. The following stipulated penalties shall be payable per violation per day to the U.S. EPA for any noncompliance identified in Section XI.a.1:

<u>Penalty Per Violation Per Day</u>	<u>Period of Noncompliance</u>
\$250	Days 1-30
\$500	Days 30-60
\$750	Over 60 days

1. Failure to submit the following plans or reports, subject to Section V.3 (Design) and the SOW:

- a. Draft Design Work Plan
- b. Final Design Work Plan
- c. Preliminary (30%) Design Document
- d. Prefinal (95%)/Final (100%) Design Documents
- e. Prefinal Inspection Report
- f. Final Inspection Report
- g. Completion of Work Report
- h. Identification of Design or Response Action contractor
- i. Failure to obtain access agreements without using best efforts.
- j. Failure to comply with any schedule in the approved Design Work Plan or approved Final Design Document

b. The following stipulated penalties shall be payable per violation per day to the U.S. EPA for any noncompliance identified in Subparagraph b.1:

<u>Penalty Per Violation Per Day</u>	<u>Period of Noncompliance</u>
\$200	Days 1-30
\$400	Days 30-60
\$600	Over 60 days

1. Violations or compliance milestones

- a. Deed Restrictions recording and conveyance
- b. Exceedance of air discharge limits
- c. Failure to comply with notice or other requirements of the Consent Order
- d. Failure to take action to abate an endangerment pursuant to Section V.14 of this Consent Order
- e. Failure to implement additional response actions pursuant to Section V.10 of this Consent Order
- f. Failure to obtain U.S. EPA approval before commencing any response action activity.

c. The following stipulated penalties shall be payable per violation per day for failure to submit progress reports:

<u>Penalty Per Violation Per Day</u>	<u>Period of Noncompliance</u>
\$100	Days 1-30
\$200	Days 30-60
\$300	Over 60 days

Upon receipt of written demand by U.S. EPA, the Respondent shall make payment to U.S. EPA within 20 days and interest shall accrue on late payments in accordance with Section VIII (Reimbursement of

Costs).

Even if violations are simultaneous, separate penalties shall accrue for separate violations of this Consent Order. Penalties accrue and are assessed per violation per day. Penalties shall accrue regardless of whether U.S. EPA has notified the Respondent of a violation or act of noncompliance. The payment of penalties shall not alter in any way the Respondent's obligations to complete the performance of the work required under this Consent Order. Stipulated penalties shall accrue, but need not be paid, during any dispute resolution period concerning the particular penalties at issue. If the Respondent prevails upon resolution, the Respondent shall pay only such penalties as the resolution requires. In its unreviewable discretion, U.S. EPA may waive its rights to demand all or a portion of the stipulated penalties due under this Section.

The stipulated penalties set forth above shall not be the sole or exclusive remedy for violations of the Consent Order. Violation of any provision of this Consent Order may subject the Respondent to civil penalties of up to twenty-five thousand dollars (\$25,000) per violation per day, as provided in Section 106(b)(1) of CERCLA, 42 U.S.C. § 9606(b)(1). The Respondent may also be subject to punitive damages in an amount up to three times the amount of any cost incurred by the U.S. EPA as a result of such violation, as provided in Section 107(c)(3) of CERCLA, 42 U.S.C. § 9607(c)(3). Should the Respondent violate this Consent Order or any portion hereof, U.S. EPA may carry out the required actions unilaterally, pursuant to Section 104 of CERCLA, 42 U.S.C. § 9604, and/or may seek judicial enforcement of this Consent Order pursuant to Section 106 of CERCLA, 42 U.S.C. § 9606.

XII. RESERVATION OF RIGHTS

Except as specifically provided in this Consent Order, nothing herein shall limit the power and authority of U.S. EPA or the United States to take, direct, or order all actions necessary to protect public health, welfare, or the environment or to prevent, abate, or minimize an actual or threatened release of hazardous substances, pollutants or contaminants, or hazardous or solid waste on, at, or from the Site. Further, nothing herein shall prevent U.S. EPA from seeking legal or equitable relief to enforce the terms of this Consent Order. U.S. EPA also reserves the right to take any other legal or equitable action as it deems appropriate and necessary, or to require the Respondent in the future to perform additional activities pursuant to CERCLA or any other applicable law.

Notwithstanding any other provision of this Consent Order, U.S. EPA expressly reserves, and this Consent Order is without prejudice to, U.S. EPA's rights to seek past costs incurred in responding to the release or threat of release of hazardous substances at or from the Site, including, without limitation, all such costs incurred by U.S. EPA up to and until the date this Consent Order is signed by the Respondent. U.S. EPA also expressly reserves, and this Consent Order is without prejudice to, U.S. EPA's rights to seek future costs, including oversight costs, incurred in response to the release or threat of release of hazardous substances and incurred after the date this Consent Order is signed by the Respondent pursuant to Section VIII (Reimbursement of Costs) of this Consent Order.

XIII. OTHER CLAIMS

By issuance of this Consent Order, the United States and U.S. EPA assume no liability for injuries or damages to persons or property

resulting from any acts or omissions of the Respondent. The United States or U.S. EPA shall not be a party or be held out as a party to any contract entered into by the Respondent or its directors, officers, employees, agents, successors, representatives, assigns, contractors, or consultants in carrying out activities pursuant to this Consent Order.

Except as expressly provided in Section XIV (Covenant Not To Sue), nothing in this Consent Order constitutes a satisfaction of or release from any claim or cause of action against the Respondent or any person not a party to this Consent Order, for any liability such person may have under CERCLA, other statutes, or the common law, including but not limited to any claims of the United States for costs, damages and interest under Sections 106(a) or 107(a) of CERCLA, 42 U.S.C. §§ 9606(a), 9607(a).

This Consent Order does not constitute a preauthorization of funds under Section 111(a)(2) of CERCLA, 42 U.S.C. § 9611(a)(2). The Respondent waives any claim to payment under Sections 106(b), 111, and 112 of CERCLA, 42 U.S.C. §§ 9606(b), 9611, and 9612, against the United States or the Hazardous Substance Superfund arising out of any action performed under this Consent Order.

No action or decision by U.S. EPA pursuant to this Consent Order shall give rise to any right to judicial review except as set forth in Section 113(h) of CERCLA, 42 U.S.C. § 9613(h).

XIV. COVENANT NOT TO SUE

Except as otherwise specifically provided in this Consent Order, upon issuance of the U.S. EPA notice referred to in Section XVII (Notice of Completion), U.S. EPA covenants not to sue the Respondent for judicial imposition of damages or civil penalties or to take administrative action against the Respondent for any

failure to perform response actions agreed to in this Consent Order except as otherwise reserved herein.

Except as otherwise specifically provided in this Consent Order, in consideration and upon the Respondent's payment of the response costs specified in Section VIII of this Consent Order, U.S. EPA covenants not to sue or to take administrative action against the Respondent under Section 107(a) of CERCLA, 42 U.S.C. § 9607(a), for recovery of oversight costs incurred by the United States in connection with this Consent Order. This covenant not to sue shall take effect upon the receipt by U.S. EPA of the payments required by Section VII (Reimbursement of Costs).

These covenants not to sue are conditioned upon the complete and satisfactory performance by the Respondent of its obligations under this Consent Order. These covenants not to sue extend only to the Respondent and do not extend to any other person.

XV. CONTRIBUTION PROTECTION

With regard to claims for contribution against the Respondent for matters addressed in this Consent Order, the Parties hereto agree that the Respondent is entitled to protection from contribution actions or claims to the extent provided by Section 113(f)(2) and 122(h)(4) of CERCLA, 42 U.S.C. §§ 9613(f)(2) and 9622(h)(4).

Nothing in this Consent Order precludes Parties from asserting any claims, causes of action or demands against any persons not parties to this Consent Order for indemnification, contribution, or cost recovery.

XVI. INDEMNIFICATION

The Respondent agrees to indemnify, save and hold harmless the United States, its officials, agents, contractors, subcontractors, employees and representatives from any and all claims or causes of action: (A) arising from, or on account of, acts or omissions of the Respondent and the Respondent's officers, heirs, directors, employees, agents, contractors, subcontractors, receivers, trustees, successors or assigns, in carrying out actions pursuant to this Consent Order; and (B) for damages or reimbursement arising from or on account of any contract, agreement, or arrangement between any one or more of the Respondents, and any persons for performance of work on or relating to the Site, including claims on account of construction delays. Nothing in this Consent Order, however, requires indemnification by the Respondent for any claim or cause of action against the United States based on negligent action taken solely and directly by U.S. EPA (not including oversight or approval of plans or activities of the Respondent).

XVII. MODIFICATIONS

Except as otherwise specified in Section V.5., if any party believes modifications to any plan or schedule are necessary during the course of this project, they shall conduct informal discussions regarding such modifications with the other parties. Any agreed-upon modifications to any plan or schedule shall be memorialized in writing within 7 business days; however, the effective date of the modification shall be the date of the RPM's oral direction. Any other requirements of this Consent Order may be modified in writing by mutual agreement of the parties. Any modification to this Consent Order shall be incorporated into and made an enforceable part of this Consent Order.

If the Respondent seeks permission to deviate from any approved

plan or schedule, the Respondent's Project Coordinator shall submit a written request to U.S. EPA for approval outlining the proposed modification and its basis.

No informal advice, guidance, suggestion, or comment by U.S. EPA regarding reports, plans, specifications, schedules, or any other writing submitted by the Respondent shall relieve the Respondent of its obligations to obtain such formal approval as may be required by this Consent Order, and to comply with all requirements of this Consent Order unless it is formally modified.

XVIII. NOTICE OF COMPLETION

Within 30 calendar days after the Respondent concludes that all work has been fully performed, the Respondent shall submit to U.S. EPA a written Completion Report, signed by a professional engineer, certifying that the work has been completed in full satisfaction of this Consent Order. U.S. EPA shall require such additional activities as may be necessary to complete the work or U.S. EPA may, based upon present knowledge and Respondent's certification to U.S. EPA, issue written notification to Respondent that the work has been completed, except for certain continuing obligations required by this Consent Order (e.g., record retention, payment of costs). If U.S. EPA determines that any activities have not been completed in accordance with this Consent Order, U.S. EPA will notify the Respondent, provide a list of the deficiencies, and require that the Respondent correct such deficiencies. The Respondent shall implement the necessary activities and shall submit a modified Completion Report in accordance with the U.S. EPA notice. Failure to implement the necessary activities shall be a violation of this Consent Order.

XIX. SUBMITTALS/CORRESPONDENCE

Any notices, documents, information, reports, plans, approvals, disapprovals, or other correspondence required to be submitted from one party to another under this Consent Order, shall be deemed submitted either when hand-delivered or as of the date of receipt by certified mail/return receipt requested, express mail, or facsimile.

Submissions to Respondent shall be addressed to:

Mr. Joseph Benedict
Compliance Officer
Forest Preserve District of DuPage County
P.O. Box 2339
185 Spring Avenue
Glen Ellyn, Illinois 60138

With copies to:

Mr. Peter Vagt
Montgomery Watson
2100 Corporate Drive
Addison, Illinois 60101

Submissions to U.S. EPA shall be addressed to:

Duane Heaton
Remedial Project Manager
U.S. EPA - Region 5
77 West Jackson Boulevard, SR-6J
Chicago, Illinois 60604-3590

With copies to:

Kurt Lindland
Assistant Regional Counsel
U.S. EPA - Region 5
77 West Jackson Boulevard, C-29A
Chicago, Illinois 60604-3590

Rick Lanhams
Project Manager
NPL Unit
Remedial Project Management Section
Division of Remediation Management
Bureau of Land
Illinois Environmental Protection Agency
2200 Churchill Road
Springfield, Illinois 62794-9276

XX. SEVERABILITY

If a court issues an order that invalidates any provision of this Consent Order or finds that the Respondent has sufficient cause not to comply with one or more provisions of this Consent Order, the Respondent shall remain bound to comply with all provisions of this Consent Order not invalidated by the court's order.

XXI. EFFECTIVE DATE

This Consent Order shall be effective upon receipt by the Respondent of a copy of this Consent Order signed by the Director, Superfund Division, U.S. EPA Region 5.

APPENDIX A

STATEMENT OF WORK FOR THE DESIGN AND IMPLEMENTATION OF RESPONSE ACTIONS AT THE DUPAGE COUNTY LANDFILL/BLACKWELL FOREST PRESERVE SITE DUPAGE COUNTY, ILLINOIS

I. PURPOSE

The purpose of this Statement of Work (SOW) is to set forth requirements for implementation of the response actions set forth in this SOW, the approved Design Work Plan, the approved Final Design, and any additional guidance provided by U.S. EPA in submitting deliverables for designing and implementing the response actions at the DuPage County Landfill/Blackwell Forest Preserve Site (Blackwell Landfill or Site).

II. DESCRIPTION OF THE RESPONSE ACTIONS/PERFORMANCE STANDARDS

Respondent Forest Preserve District of DuPage County (FPD) shall design and implement the response actions to meet the performance standards and specifications set forth in this SOW. Performance standards shall include cleanup standards, standards of control, quality criteria and other substantive requirements, criteria or limitations set forth in this SOW and/or Administrative Order on Consent (Consent Order).

1. Site Security

During construction, the FPD shall install and maintain barriers around all areas of the Site which could leave landfill refuse, landfill leachate, contaminated soils, or contaminated groundwater exposed, or which could present physical hazards to prevent access and/or vandalism to the Site. Barriers shall be sufficient to prevent access to the construction area without willful disregard of safety by trespassers. Warning signs shall be posted at 200-foot intervals along the barriers and at all gates or entryways. The warning signs shall advise that the area is hazardous due to chemicals in the soils and liquids including groundwater, which pose a risk to public health through direct contact with soils and contaminated liquids. The signs shall also provide a telephone number to call for further information. Fencing of each area shall be completed prior to initiation of any construction activities within each respective area of the Site.

The FPD shall inspect all barriers on a regular basis. Incidents of vandalism, trespassing, and breaches of the barriers or disappearance of warning signs shall be recorded by the FPD and reported to U.S. EPA as soon as possible. The FPD shall repair any damage or deterioration, or perform any other maintenance within five (5) business days of the FPD becoming aware that repair or

maintenance is necessary.

Upon completion of construction activities within each fenced area, and upon written approval from U.S. EPA, the FPD may remove barrier material from each specific enclosed area of the Site.

2. Restrictive Covenants/Deed Restrictions

Within 30 days after submittal of the 30% Design (at which time the landfill will have been delineated and surveyed), the FPD shall execute and record with the DuPage County Recorder the restrictive covenants in Appendix B of this Consent Order. Within 20 days, the FPD shall provide notice to U.S. EPA that such restrictive covenants have been executed and recorded.

3. Construction, Installation, and Operation of a Containment System for Response Actions

All construction activities shall be performed in accordance with the general industry standards at 29 CFR 1910 and 1926. Threshold limit values shall be monitored in the breathing zone during construction and monitoring activities.

A. Landfill Cover

The FPD shall delineate the landfill boundary. The locations of soil borings and/or the method to be followed in determining the sequential placement of soil borings to be used to delineate the landfill boundary shall be specified in the Design Work Plan.

The FPD shall conduct soil borings of sufficient number and appropriate locations to satisfactorily determine areas of the landfill cover which do not have a minimum of two feet of low permeability material.

The FPD shall conduct soil borings in areas where there are trees near the edge of the landfill to determine whether there is buried refuse beneath the area of the root zones of the trees and if there is, to determine the characteristics and total thickness of the cover between the ground surface and the refuse. With U.S. EPA concurrence, the FPD will develop a rationale for acceptable cover thickness in combination with specific tree types, and a tree management program that will allow the maintenance of trees on the landfill in safe areas, without threatening the integrity of the cover over refuse.

The FPD shall design and construct any necessary repairs to the landfill cover to ensure that all areas of the landfill have a low permeability layer with a minimum thickness of two feet, and that there are no areas where perched surface water infiltration seeps from the sideslopes of the landfill. The

repaired and existing cap shall extend to the edge of the landfill and be sloped where necessary to promote surface water drainage off the landfill. The borrow source for the impermeable layer is subject to U.S. EPA approval. Upon completion, the FPD shall vegetate the landfill. The FPD shall conduct groundwater and leachate monitoring and routine maintenance of the cover as part of the requirements to be established in the Operation and Maintenance (O & M) Plan.

Municipal refuse unearthed during cap repair may be consolidated under the landfill cap. If, during construction, a condition arises indicating that hazardous substances may have been unearthed, the material shall be analyzed using the Toxicity Characteristic Leaching Procedure (TCLP), and if the material is hazardous, all hazardous substances shall be removed off-site in accordance with Section V.7. of the Consent Order.

During construction, the National Ambient Air Quality Standards (NAAQS) are standards that are to be considered. Particulate matter standard specified at 40 CFR Part 50 is 150 ug/m³, 24-hour average concentration, and 50 ug/m³, annual arithmetic mean. The procedures to determine compliance with the standard set forth at 40 CFR Part 50, Appendix K, shall be followed.

B. Leachate Collection

The FPD shall install a leachate collection system such that leachate shall be pumped from the landfill, piped to a central storage area on the Site, and periodically trucked to a facility holding a National Pollutant Discharge Elimination System (NPDES) Permit pursuant to 40 CFR Parts 122 and 126 for treatment and disposal. The FPD shall analyze the leachate in accordance with the monitoring schedule in the approved Operation and Maintenance Plan to ensure that pretreatment pursuant to 40 CFR Part 403 is not required prior to transporting the leachate to a NPDES-permitted facility. If analysis indicates that pretreatment is necessary, the FPD shall propose to U.S. EPA for approval an alternate method of treating and disposing of leachate.

The FPD shall conduct TCLP analysis and, as appropriate, properly contain and dispose of any sediments which accumulate in the leachate storage vessel at a properly-permitted disposal facility.

C. Landfill Gas Venting

The FPD shall design the leachate extraction system such that the leachate extraction wells installed as part of these response actions will also be utilized as a passive landfill

gas venting system. The 25 existing gas vents shall be maintained as part of the gas venting system.

Because the Blackwell Landfill is in a severe ozone nonattainment area, VOC emissions shall not exceed 25 tons per year. If VOC emissions exceed this level, the major source requirement under Section 182(d) of the Clean Air Act applies. State of Illinois requirements at 35 IAC 218 shall also be met.

The National Ambient Air Quality Standards (NAAQS) are to be complied with for Particulate Matter (40 CFR Part 50), which has a standard of 150 ug/m³, 24-hour average concentration, and 50 ug/m³, annual arithmetic mean. The procedures to determine compliance with the standard are in 40 CFR Part 50, Appendix K.

4. Installation and Operation of Monitoring Program for Response Actions

The FPD shall implement monitoring programs to evaluate and ensure that the construction and implementation of the response actions complies with approved plans and design documents and performance standards. The FPD shall submit monitoring programs as part of the Design Work Plan, which shall address the specific components of the response actions listed below. Each sample shall be analyzed for a list of parameters approved by U.S. EPA during design.

A. Groundwater Monitoring

The FPD shall implement a groundwater monitoring program as identified in the Design Work Plan or as required by U.S. EPA. The FPD shall design a groundwater monitoring program to detect changes in the chemical concentration of the groundwater in both the glacial outwash aquifer and in the underlying bedrock aquifer in downgradient areas between the landfill and the Forest Preserve boundary.

Upon written approval by U.S. EPA of the Design Work Plan, the FPD shall assess the integrity of the monitoring wells. Following written approval of the Design Work Plan, and until the Record of Decision and Consent Decree or Unilateral Administrative Order are in place establishing a long-term monitoring program, the FPD shall, at a minimum, sample and analyze groundwater at the locations identified in the Design Work Plan for all volatile organic compounds on the Target Compound List (TCL) on a quarterly basis, and all semivolatile organic compounds on the TCL and the full Target Analyte List (TAL) on an annual basis, and any other sampling parameters designated in the Design Work Plan to ensure that there is no exceedance of any Maximum Contaminant Level (MCL) designated at 40 CFR Part 141 for any contaminant in either the glacial

outwash aquifer or the underlying bedrock aquifer at the point of compliance described in Section II.4.F. of this SOW. Field parameters to be measured and recorded for each monitoring well are groundwater elevation, pH, temperature, turbidity, specific conductance, redox potential, and dissolved oxygen.

After construction of the response actions, the FPD shall continue sampling and analysis of groundwater between the landfill and the FPD boundary until a Record of Decision is issued by U.S. EPA and a Consent Decree or Unilateral Administrative Order is in effect to address long-term groundwater monitoring requirements at the locations identified in the Design Work Plan and analyzed for all TCL, TAL, and any other sampling parameters designated in the Design Work Plan, to ensure that there is no exceedance of any MCL for any contaminant in either the glacial outwash aquifer or the underlying bedrock aquifer at the point of compliance described in Section II.4.F. of this SOW. Field parameters to be measured and recorded for each monitoring well are groundwater elevation, pH, temperature, turbidity, and specific conductivity.

Compliance with the State of Illinois' Groundwater Quality Standards at 35 IAC 620 is required, and such compliance shall be addressed in the Design Work Plan.

If quarterly groundwater monitoring over a minimum period 8 quarters indicates that contaminant concentrations throughout the system of groundwater monitoring wells are not increasing, the FPD may petition U.S. EPA to allow monitoring on a less frequent basis. Such a petition must be approved in writing by U.S. EPA before the FPD can reduce the monitoring frequency.

If additional information indicates that the groundwater monitoring program is inadequate, U.S. EPA may require additional groundwater monitoring wells and field or laboratory analysis of additional parameters.

B. Air

At all times during the performance of the response actions that result in disturbance of the landfill cover, the FPD will conduct air monitoring as part of the approved Health and Safety Plan for the response actions. The objective of the monitoring will be to ensure the health and safety of the workers and general public. In addition, the air emissions shall not exceed any requirements specified in Section II.3.C. of this SOW. If air emissions exceed these levels, the FPD shall take corrective measures as developed in the Final Contingency Plan submitted as part of the Prefinal/Final Design.

C. Soils

During earthmoving as part of the cap repair, and during any other part of the response actions, unearthed material should be visually monitored on a continuous basis to ascertain, based on best professional judgement, whether hazardous substances may have been unearthed. If it is suspected that hazardous substances may have been unearthed, actions shall be taken in accordance with Section II.3.A. of this SOW.

D. Extraction System Monitoring

The FPD shall initiate a monitoring program for the extraction system as identified in the approved Design Work Plan or as required by U.S. EPA. The monitoring program shall be designed to detect any conditions that may interfere with the proper operation and function of the system. System monitoring shall include periodic collection and field/laboratory analysis of leachate/residue samples in accordance with the monitoring schedule in the approved Operation and Maintenance Plan to determine the need for pretreatment prior to trucking of the leachate to a NPDES-permitted facility or disposal of any residues. Sampling shall occur at a frequency and duration established in the approved Final Design. Once the components of the response actions are determined to be both operational and functional, the FPD shall follow the sampling procedures and frequencies established in the O&M Plan.

F. Points of Compliance

In order to monitor and evaluate the effectiveness of the response actions throughout the Site, certain locations at which there are groundwater monitoring wells shall be selected as points of compliance. Additional wells may be included during the development of the Design Work Plan and the Operation and Maintenance (O&M) Plan. The location, screened interval, and other pertinent details for any additional wells to be installed pursuant to the Consent Order or this SOW shall be approved in writing by the U.S. EPA. A major consideration for determining the need for additional monitoring wells will be ensuring adequate monitoring of both the glacial outwash aquifer and the underlying bedrock aquifer in the areas between the landfill and the Forest Preserve's downgradient boundary. Wells designated as representing the Points of Compliance shall be designated in the Design Work Plan. All of these wells shall be considered as groundwater points of compliance.

The wells are grouped into wells for detection monitoring and wells for compliance monitoring, as defined below. If any of the wells are destroyed or in any way becomes unusable, the

FPD shall repair or replace each unusable well. Detection monitoring shall be conducted at wells between the landfill and the Forest Preserve's downgradient boundary. The purpose of detection monitoring shall be to ensure that contaminant levels are not increasing; the reduction of contaminant loading, in combination with natural attenuation and dilution, should allow the standards of 35 IAC 620.410 to be achieved over time. Compliance monitoring shall be conducted at the Forest Preserve's downgradient boundary. The purpose of compliance monitoring shall be to ensure that concentrations of groundwater contaminants do not exceed any MCL, an excess cancer risk greater than 10^{-6} , or a Hazard Index greater than or equal to 1.0, whichever is more stringent, at the Forest Preserve's downgradient (western) boundary. The frequency of sampling shall be quarterly and the parameters sampled for during detection and compliance monitoring are specified in Section II.4.A. of this SOW.

Points of Compliance for the monitoring and evaluation of the landfill gas venting shall be addressed in the Design Work Plan and the O & M Plan, but shall not exceed a cumulative cancer risk of 1.0×10^{-6} or a Hazard Index greater than or equal to 1.0 to site visitors or off-site residents. The Baseline Risk Assessment conducted as part of the RI has shown that in the current condition, the cumulative cancer risk does not exceed 1.0×10^{-6} nor does the Hazard Index equal or exceed 1.0 for site visitors or off-site residents.

III. SCOPE OF DESIGN AND IMPLEMENTATION OF RESPONSE ACTIONS

The design/response actions shall consist of five tasks. All plans are subject to EPA approval.

Task 1: Design Work Plan.

Task 2: Design Phases

- A. Preliminary Design
- B. Prefinal Design/ Final Design

Task 3: Response Actions/Construction

- A. Preconstruction Meeting
- B. Prefinal Inspection
- C. Final Inspection
- D. Reports
 - 1. Completion of Work Report

Task 4: Operation and Maintenance

Task 5: Performance Monitoring

Task 1: Design Work Plan

The FPD shall submit a Work Plan which shall document the overall management strategy for performing pre-design investigations, design, construction, operation, maintenance and monitoring of response actions for U.S. EPA review and approval. The plan shall document the responsibility and authority of all organizations and key personnel involved with the implementation and shall include a description of qualifications of key personnel directing the pre-design investigations and the design, including contractor personnel. The Work Plan shall also contain a schedule for the pre-design investigations and design activities.

The pre-design investigations shall include soil boring activities to delineate the landfill boundary, to delineate the areas of the landfill that do not meet the State of Illinois requirements at 35 IAC Part 807, to determine whether there is refuse in areas where trees currently grow near the edge of the landfill, and to gather any other information the FPD determines to be necessary for design purposes. A health and safety plan shall be submitted for the pre-design investigations. The results of the pre-design investigations will be submitted as part of the Preliminary (30%) Design.

The FPD shall submit a Design Work Plan in accordance with Section V.3 of the Consent Order and Section V of this SOW.

Task 2: Design Phases

The FPD shall prepare construction plans and specifications to implement the response actions at the Site as described in this SOW. Plans and specifications shall be submitted in accordance with the schedule set forth in Section V below. Subject to approval by U.S. EPA, the FPD may submit more than one set of design submittals reflecting different components of the response actions. All plans and specifications shall demonstrate that the response actions shall meet all objectives of Consent Order and this SOW, including all Performance Standards. The FPD shall meet regularly with U.S. EPA to discuss design issues.

A. Preliminary Design

The FPD shall submit the Preliminary Design when the design effort is approximately 30 % complete. The Preliminary Design submittal shall include or discuss, at a minimum, the following:

- Preliminary plans, drawings, and sketches, including design calculations;

- Results of pre-design investigations and any additional field sampling, unless submitted previously as a separate report;
- Design assumptions and parameters;
- Proposed cleanup verification methods;
- Draft Performance Standard Verification Plan;
- Outline of required specifications;
- Proposed siting/locations of processes/construction activity;
- Expected long-term monitoring and operation requirements;
- Real estate, easement, and permit requirements;
- Preliminary construction schedule, including contracting strategy.

C. Prefinal and Final Designs

The FPD shall submit the Prefinal Design when the design effort is 95% complete and shall submit the Final Design when the design effort is 100% complete. The Prefinal Design shall fully address all comments made to the preceding design submittal. The Final Design shall fully address all comments made to the Prefinal Design and shall include reproducible drawings and specifications suitable for bid advertisement. The Prefinal Design shall serve as the Final Design if U.S. EPA has no further comments and issues the notice to proceed.

The Prefinal and Final Design submittals shall include those elements listed for the Preliminary Design, as well as, the following:

- Final Performance Standard Verification Plan;
- Final Construction Quality Assurance Plan;
- Final QAPP/Final H & S Plan/Final FSP/Final Contingency Plan;
- Draft Operation and Maintenance Plan;
- Capital and Operation and Maintenance Cost Estimate. This cost estimate shall refine the FS cost estimate to reflect the detail presented in the Final Design;
- Final Project Schedule for the construction and

implementation of the response actions which identify timing for initiation and completion of all critical path tasks. The final project schedule submitted as part of the Final Design shall include specific dates for completion of the project and major milestones.

Task 3: Response Actions/Construction

The FPD shall implement the response actions as detailed in the approved Final Design. The following activities shall be completed in constructing the response actions.

A. Preconstruction inspection and meeting:

The FPD shall participate with the U.S. EPA and the State in a preconstruction inspection and meeting to:

- a. Review methods for documenting and reporting inspection data;
- b. Review methods for distributing and storing documents and reports;
- c. Review work area security and safety protocol;
- d. Discuss any appropriate modifications of the construction quality assurance plan to ensure that site-specific considerations are addressed; and,
- e. Conduct a Site walk-around to verify that the design criteria, plans, and specifications are understood and to review material and equipment storage locations.

The preconstruction inspection and meeting shall be documented by a person designated by the FPD and minutes shall be transmitted to all parties.

B. Prefinal inspection:

Within 10 business days after the FPD makes a preliminary determination that construction is complete, the FPD shall notify the U.S. EPA and the State for the purposes of conducting a prefinal inspection. The prefinal inspection shall consist of a walk-through inspection of the entire Facility. The prefinal inspection is to determine whether the project is complete and consistent with the contract documents and the response actions. Any outstanding construction items discovered during the inspection shall be identified and noted. Additionally, treatment equipment shall be operationally tested by the FPD. The FPD shall certify that the equipment has performed to meet the purpose and intent of the specifications. Retesting shall be completed where

deficiencies are revealed.. The prefinal inspection report shall outline the outstanding construction items, actions required to resolve items, completion date for these items, and a proposed date for final inspection.

C. Final inspection:

Within 10 business days after completion of any work identified in the prefinal inspection report, the FPD shall notify the U.S. EPA and the State for the purposes of conducting a final inspection. The final inspection shall consist of a walk-through inspection of the Facility. The prefinal inspection report shall be used as a checklist with the final inspection focusing on the outstanding construction items identified in the prefinal inspection. Confirmation shall be made that outstanding items have been resolved.

D. Reports

1. Completion of Work Report

Within 45 days of a successful final inspection, the FPD shall submit a Completion of Work Report. In the report, a registered professional engineer and the FPD's Project Coordinator shall state that the response actions have been completed in satisfaction of the requirements of this Consent Order. The written report shall include as-built drawings signed and stamped by a professional engineer. The report shall contain the following statement, signed by a responsible corporate official of the FPD or the FPD's Project Coordinator:

"To the best of my knowledge, after thorough investigation, I certify that the information contained in or accompanying this submission is true, accurate and complete. I am aware there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations."

Task 4: Operation and Maintenance

The FPD shall prepare an Operation and Maintenance (O&M) Plan to cover both implementation and maintenance of the response actions until a Record of Decision is issued by U.S. EPA and a Consent Decree or Unilateral Administrative Order is in effect to address long-term maintenance and monitoring. An initial Draft O&M Plan shall be submitted as a Final Design document submission. The final O&M Plan shall be submitted to U.S. EPA prior to the pre-final construction inspection, in accordance with the approved construction schedule. The plan shall be composed of the following elements:

1. Description of normal operation and maintenance ;
 - a. Description of tasks for operation;
 - b. Description of tasks for maintenance;
 - c. Description of prescribed treatment or operation conditions; and
 - d. Schedule showing frequency of each O&M task.
2. Description of potential operating problems;
 - a. Description and analysis of potential operation problems;
 - b. Sources of information regarding problems; and
 - c. Common and/or anticipated remedies.
3. Description of routine monitoring and laboratory testing;
 - a. Description of monitoring tasks;
 - b. Description of required data collection, laboratory tests and their interpretation;
 - c. Required quality assurance, and quality control ;
 - d. Schedule of monitoring frequency and procedures for a petition to U.S. EPA to reduce the frequency of or discontinue monitoring; and
 - e. Description of verification sampling procedures if Cleanup or Performance Standards are exceeded in routine monitoring.
4. Description of alternate O&M;
 - a. Should systems fail, alternate procedures to prevent release or threatened releases of hazardous substances, pollutants or contaminants which may endanger public health and the environment or exceed performance standards; and
 - b. Analysis of vulnerability and additional resource requirement should a failure occur.
5. Corrective Action;
 - a. Description of corrective action to be implemented in the event that cleanup or performance standards are exceeded; and
 - b. Schedule for implementing these corrective actions.
6. Safety plan;
 - a. Description of precautions, of necessary equipment, etc., for Site personnel; and
 - b. Safety tasks required in event of systems failure.

7. Description of equipment; and
 - a. Equipment identification;
 - b. Installation of monitoring components;
 - c. Maintenance of Site equipment; and
 - d. Replacement schedule for equipment and installed components.
8. Records and reporting mechanisms required.
 - a. Daily operating logs;
 - b. Laboratory records;
 - c. Records for operating costs;
 - d. Mechanism for reporting emergencies;
 - e. Personnel and maintenance records; and
 - f. Monthly/annual reports to State agencies.

Task 5: Performance Monitoring

Performance monitoring shall be conducted to ensure that all Performance Standards are met.

A. Performance Standard Verification Plan

The purpose of the Performance Standard Verification Plan is to provide a mechanism to ensure that Performance Standards for the response actions are met. The Draft Performance Standards Verification Plan shall be submitted with the Preliminary Design. The Final Performance Standards Verification Plan, which is part of the Prefinal/Final Design, shall be implemented on the approved schedule. The Performance Standards Verification Plan shall include:

1. Quality Assurance Project Plan
2. Health and Safety Plan
3. Field Sampling Plan

IV. CONTENT OF SUPPORTING PLANS

The documents listed in this section -- the Quality Assurance Project Plan, the Field Sampling Plan, the Health and Safety Plan, the Contingency Plan and the Construction Quality Assurance Plan -- are documents which must be prepared and submitted as outlined in Section III of this SOW. The following section describes the required contents of each of these supporting plans.

1. Quality Assurance Project Plan

The FPD shall develop a Site specific Quality Assurance Project Plan (QAPP), covering sample analysis and data handling for samples collected in all phases of future Site work, based upon the Consent Order and guidance provided by U.S. EPA. The QAPP shall be

consistent with the requirements of the EPA Contract Lab Program (CLP) for laboratories proposed outside the CLP. The QAPP shall at a minimum include:

Project Description

- * Facility Location History
- * Past Data Collection Activity
- * Project Scope
- * Sample Network Design
- * Parameters to be Tested and Frequency
- * Project Schedule

Project Organization and Responsibility

Quality Assurance Objective for Measurement Data

- * Level of Quality Control Effort
- * Accuracy, Precision and Sensitivity of Analysis
- * Completeness, Representativeness and Comparability

Sampling Procedures

Sample Custody

- * Field Specific Custody Procedures
- * Laboratory Chain of Custody Procedures

Calibration Procedures and Frequency

- * Field Instruments/Equipment
- * Laboratory Instruments

Analytical Procedures

- * Non-Contract Laboratory Program
Analytical Methods
- * Field Screening and Analytical Protocol
- * Laboratory Procedures

Internal Quality Control Checks

- * Field Measurements
- * Laboratory Analysis

Data Reduction, Validation, and Reporting

- * Data Reduction
- * Data Validation
- * Data Reporting

Performance and System Audits

- * Internal Audits of Field Activity
- * Internal Laboratory Audit
- * External Field Audit
- * External Laboratory Audit

Preventive Maintenance

- * Routine Preventative Maintenance Procedures and Schedules
- * Field Instruments/Equipment
- * Laboratory Instruments

Specific Routine Procedures to Assess Data Precision, Accuracy, and Completeness

- * Field Measurement Data
- * Laboratory Data

Corrective Action

- * Sample Collection/Field Measurement
- * Laboratory Analysis

Quality Assurance Reports to Management

The FPD shall attend a pre-QAPP meeting with U.S. EPA. The FPD shall submit a draft QAPP to U.S. EPA for review and approval as part of the Design Work Plan.

2. Health and Safety Plan

The FPD shall develop a health and safety plan which is designed to protect on-site personnel and area residents and Forest Preserve visitors from physical, chemical and all other hazards posed by these response actions. The safety plan shall follow U.S. EPA guidance and all OSHA requirements as outlined in 29 CFR 1910 and 1926. The safety plan shall develop the performance levels and criteria necessary to address the following areas:

- Facility Description
- Personnel
- Levels of protection
- Safe work practices and safe guards
- Medical surveillance
- Personal and environmental air monitoring
- Personal protective equipment
- Personal hygiene
- Decontamination - personal and equipment
- Site work zones
- Contaminant control
- Contingency and emergency planning
- Logs, reports and record keeping

As part of the health and safety plan, the FPD shall submit a Contingency Plan describing procedures to be used in the event of an accident or emergency at the site. The draft Contingency Plan shall be submitted with the Prefinal Design and the Final Contingency Plan shall be submitted with the Final Design. The Contingency Plan shall include, at a minimum, the following:

- A. Name of the person or entity responsible for responding in the event of an emergency incident.
- B. Plan and date(s) for meeting(s) with the local community, including local, State and Federal agencies involved in the cleanup, as well as local emergency squads and hospitals.
- C. First aid medical information.
- D. Air Monitoring Plan.

3. Field Sampling Plan

The FPD shall develop a field sampling plan (as described in "Guidance for Conducting Remedial Investigations and Feasibility Studies Under CERCLA," October 1988). The Field Sampling Plan should supplement the QAPP and address all sample collection activities.

4. Construction Quality Assurance Plan

The FPD shall submit a Construction Quality Assurance Plan (CQAP) which describes the Site specific components of the quality assurance program which shall ensure that the completed project meets or exceeds all design criteria, plans, and specifications. The draft CQAP shall be submitted with the Prefinal Design and the final CQAP shall be submitted with the final design. The CQAP shall contain, at a minimum, the following elements:

- A. Responsibilities and authorities of all organizations and key personnel involved in the design and construction of the response actions.
- B. Qualifications of the Quality Assurance Official to demonstrate he possesses the training and experience necessary to fulfill his identified responsibilities.
- C. Protocols for sampling and testing used to monitor construction.
- D. Identification of proposed quality assurance sampling activities including the sample size, locations, frequency of testing, acceptance and rejection data sheets, problem identification and corrective measures reports, evaluation reports, acceptance reports, and final documentation. A description of the provisions for final storage of all records consistent with the requirements of the Consent Order shall be included.
- E. Reporting requirements for CQA activities shall be described in detail in the CQA plan. This shall include

such items as daily summary reports, inspection data sheets, problem identification and corrective measures reports, design acceptance reports, and final documentation. Provisions for the final storage of all records shall be presented in the CQA plan.

V. SUMMARY OF MAJOR DELIVERABLES/SCHEDULE

A summary of the project schedule and reporting requirements contained in this SOW is presented below:

<u>Submission</u>	<u>Due Date</u>
1. Design Work Plan	Forty-five (45) days after U.S. EPA's approval the FPD's contractor and Project Coordinator
2. Preliminary Design (30%)	In accordance with schedule in the approved Design Work Plan
3. Prefinal Design (95%)	In accordance with schedule in the approved Design Work Plan
4. Final Design (100%)	Thirty (30) days after receipt of U.S. EPA's comments on the Prefinal Design
5. Award Contract(s) for the Response Actions	As established in the schedule in the approved Final Design
6. Pre-Construction Inspection and Meeting	Fifteen (15) days after Award of Contract(s) for the Response Actions
7. Initiate Construction of Response Actions	Fifteen (15) days after Pre-Construction Inspection and Meeting
8. Completion of Construction	In accordance with the construction schedule in the approved Final Design
9. Prefinal Inspection	No later than fifteen (15) days after completion of construction

SubmissionDue Date

- | | |
|--------------------------------|---|
| 10. Prefinal Inspection Report | Fifteen (15) days after completion of prefinal inspection |
| 11. Final Inspection | Fifteen (15) days after completion of work identified in prefinal inspection report |
| 12. Final O&M Plan | No later than Prefinal Inspection |
| 13. Completion of Work Report | Sixty (60) days after final inspection |

APPENDIX B

DECLARATION OF DEED RESTRICTIONS AND RESTRICTIVE COVENANTS UPON REAL ESTATE

The Forest Preserve District of DuPage County, owner of the real estate described below, hereby impose restrictions on that portion of the described real estate which is known as the DuPage County Landfill/Blackwell Forest Preserve, (hereinafter "the Site") within the Blackwell Forest Preserve, in Section 26, Township 39 North, Range 9 East, DuPage County, Illinois:

The following restrictions are imposed upon the Site, its present and any future owner (including heirs to the above described real estate), their authorized agents, assigns, employees, or persons acting under their direction or control, for the purposes of protecting public health or welfare or the environment, preventing interference with the performance, and maintenance, of any response actions selected and/or undertaken by the United States Environmental Protection Agency ("U.S. EPA"), or any party acting as agent for the U.S. EPA, pursuant to Section 104 of the Comprehensive Environmental Response, Compensation, and Liability Act ("CERCLA"). Specifically, the following deed restrictions shall apply to the Site:

1. There shall be no use of, or activity at, the Site that may interfere with, damage, or otherwise impair the effectiveness of any response action (or component thereof) selected and/or undertaken by U.S. EPA, or any party acting as agent for U.S. EPA, pursuant to Section 104 of CERCLA, except with written approval of U.S. EPA, and consistent with all statutory and regulatory requirements;
2. There shall be no consumptive, extractive, or other use of the groundwater underlying the Site that could cause exposure of humans or animals to the groundwater underlying the Site. In addition, there shall be no installation of drinking water production wells on the Site, except as approved in writing by U.S. EPA;;
3. There shall be no residential, commercial, or agricultural use of the landfill, including, but not limited to, any on-site excavation, landfilling, mining, invasive construction, and drilling, except as approved in writing by U.S. EPA;
4. There shall be no tampering with, or removal of, the containment or monitoring systems that remain on the Site as a result of implementation of any response action by U.S. EPA, or any party acting as agent for U.S. EPA, and which is selected and/or undertaken by U.S. EPA pursuant to Section 104 of CERCLA;

5. There shall be no activities that cause destruction of vegetation on the landfill or otherwise could result in degradation of the remedial components; and
6. There shall be no ignition sources on the landfill except as approved, in writing by U.S. EPA.

The obligation to implement and maintain the above restrictions shall run with that portion of the land that is described as the Site and shall remain in effect until such time as U.S. EPA provides to the landowner a written certification stating the above restrictions are no longer necessary.

IN WITNESS WHEREOF, has caused these Deed Restrictions to be executed this _____ day of _____, 199__.

Respondent Landowner: _____

Address

STATE OF ILLINOIS)
)
COUNTY OF DUPAGE)

ss:

Before me, the undersigned, a Notary Public in and for said County and State, this _____ day of _____, 199__, personally appeared _____, and acknowledged this instrument.

Notary Public

My commission expires:

A2

MAY 22, 1996 U.S. EPA APPROVAL LETTER



UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION 5
77 WEST JACKSON BOULEVARD
CHICAGO, IL 60604-3590

REPLY TO THE ATTENTION OF:
SR-6J

VIA FACSIMILE

May 22, 1996

Peter J. Vagt, Ph.D., CPG
Vice-President, Principal Hydrogeologist
Montgomery Watson
2100 Corporate Drive
Addison, Illinois 60101

Subject: Blackwell Forest Preserve Landfill
DuPage County, Illinois

Dear Dr. Vagt:

Your April 17, 1996 submittal of the Draft Expedited Work Plan and PreFinal Design for the Leachate Collection System (LCS) at the subject site is approved. The attached comments should be addressed in the Final Design for the LCS.

If you have any questions, please call me at 312-886-6399.

Very truly yours,

A handwritten signature in cursive script that reads "Duane Heaton".

Duane Heaton
Remedial Project Manager

cc: Joseph Benedict, FPD
Rick Lanham, IEPA
Kurt Lindland, C-29A

Comments Regarding the
April 1996 Draft Expedited Work Plan and PreFinal Design
for the
Leachate Collection System Response Action
at the Blackwell Forest Preserve Landfill
in DuPage County, Illinois

Section 2, Design Performance Standards, Soils (Page 5) -- The document states "If hazardous substances are unearthed, based on visual observations, *and not returned to the borehole or excavation* (emphasis added), the material will be segregated, analyzed, and disposed of as required by the SOW." This statement does not comply with Section II.3.A. of the SOW, which requires states "If, during construction, a condition arises indicating that hazardous substances may have been unearthed, the material shall be analyzed using the Toxicity Characteristic Leaching Procedure (TCLP), and if the material is hazardous, all hazardous substances shall be removed off-site in accordance with Section V.7. of the Consent Order."

Monitoring unearthed material should also be conducted with a photoionization detector, and any unearthed non-hazardous materials which are not consolidated under the cap should be disposed of as a special waste.

Section 3, Introduction (Page 8) -- The second paragraph states that drawings and specifications will not be prepared for bidding purposes. This is somewhat confusing, as some drawings and the outline of specifications for the LCS are included in this submittal.

Section 4, Reports and Submittals -- The document states that Monthly Progress Reports will be submitted to U.S. EPA as required by the AOC. Please note that Section XIX of the AOC states that submissions required under the AOC shall be addressed to Duane Heaton, with copies to Kurt Lindland (U.S. EPA Assistant Regional Counsel) and Rick Lanham (IEPA Project Manager).

Section 5, Proposed Project Schedule -- As discussed in an April 18, 1996 letter from Duane Heaton to Peter Vagt, U.S. EPA and IEPA cannot reasonably be expected to meet one-week and two-week review time on documents. We are making a determined effort to review the documents in a timely manner; however, the three separate documents submitted in April make timely reviews difficult. For scheduling purposes, a 45-day review is generally used.

Drawing D2 -- It appears that the leachate extraction pumps in the wells will release air inside the wells. Please address any potential explosive hazards which could result from the mixture of oxygen and methane inside the wells. Would transfer of the air released by each pump directly to the atmosphere outside the well by means of a pipe be appropriate?

Drawing D3 -- If active landfill gas extraction is implemented, it will become imperative that the water seal in the dripleg is maintained. Under normal circumstances this would not be a problem; however, regular inspections should probably be included in the O&M Plan.

Drawing D4 -- Although the loadout facility detail states "grade for positive drainage and blend with existing pavement", the drawing shows the top of the concrete manhole flush with the existing pavement. There is a depression east of this location, and it appears that surface runoff may drain through this area. Is this area prone to flooding or overland flow which could allow surface runoff to enter the manhole and the leachate holding tank?

B



B

**CONSTRUCTION SPECIFICATIONS
LEACHATE COLLECTION SYSTEM**

CONSTRUCTION SPECIFICATIONS LEACHATE COLLECTION SYSTEM

BLACKWELL FOREST PRESERVE LANDFILL
DUPAGE COUNTY, ILLINOIS

MAY 1997

PREPARED FOR:
FOREST PRESERVE DISTRICT
DUPAGE COUNTY, ILLINOIS

• • •
PREPARED BY:
MONTGOMERY WATSON
ADDISON, ILLINOIS

PROJECT NO. 1252008.0409

CONSTRUCTION SPECIFICATIONS LEACHATE COLLECTION SYSTEM

BLACKWELL FOREST PRESERVE LANDFILL
DUPAGE COUNTY, ILLINOIS

MAY 1997


for Dean R. Free, P.E.
Project Engineer

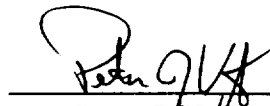

Peter J. Vagt, Ph.D., P.G.
Project Coordinator

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DIVISION 1 - GENERAL REQUIREMENTS

SECTION 01010

SUMMARY OF WORK

PART 1 - GENERAL

1.01 SECTION INCLUDES

- A. Work covered by contract documents
- B. Work performed by others
- C. Work sequence

1.02 WORK COVERED BY CONTRACT DOCUMENTS

- A. The work covered by this document includes, but is not limited to:
 - 1. Provide mobilization, demobilization, Contractor site safety plan and implementation, clearing and grubbing, and silt fencing to properly perform the leachate collection system installation.
 - 2. Install gas header pipe, compressed air supply line, leachate gravity conveyance pipe, leachate pressure conveyance pipe, control wires, and with associated cleanouts, driplegs, and risers.
 - 3. Install lift station including pump and controls.
 - 4. Install buried leachate holding tank with floats, controls, and loadout facility.
 - 5. Install leachate extraction well pumps, controls, and wellheads.
 - 6. Install compressor station with building and foundation, compressor, filters, dryers, and control system.
 - 7. Provide gravity connections of leachate collection system to two existing liquids cutoff trench manholes.
 - 8. Provide electrical system supply with connections and controls.

9. Provide chainlink fencing with gates.
 10. Provide crushed aggregate paving.
 11. Provide surface restoration of disturbed areas. Owner will supply seeding, fertilizing, and mulching subcontractor.
- B. The Blackwell Forest Preserve Landfill site will be open to the public throughout construction of the leachate collection system. Extreme caution must be used when entering, working at, and leaving the site.
- C. Leachate collection system construction is one of the many activities that will take place at the Blackwell Forest Preserve Landfill site during the response action process. The site is a Superfund site and all work must be performed in conformance with the Administrative Order by Consent between the U.S. EPA and the Respondent, Forest Preserve District of DuPage County, Illinois (U.S. EPA Docket No. V-W-'96-C-341, March 7, 1996) and all related documents.
- D. Storage of materials and equipment will occur at an area designated by the Forest Preserve District for staging of construction materials and facilities.
- E. The site is not completely secured by a fence or other manner. The Contractor shall be responsible for protecting his material and equipment from vandalism or damage.
- F. During construction of the LCS, site security measures shall be taken by the Contractor to prevent public access to areas of construction or potential contamination, without willful disregard of safety by trespassers. Site security shall consist of:
- General Warning Signs (e.g., around work area, on Hazard Barriers)
 - Hazard Barriers (e.g., fencing, barricades, excavation coverings)
 - Routine inspections of the site security measures
 - Necessary maintenance.

Any incidents related to site security will be documented and reported to the Engineer for reporting to the Owner and U.S. EPA. The Owner will be responsible for site entrance warning signs and coordination with the park officials for general notification.

1.03 WORK PERFORMED BY OTHERS

- A. The Forest Preserve District of DuPage County and Montgomery Watson reserve the right to approve all subcontractors and suppliers for this project. If the Owner has a reasons to believe that any of the subcontractors and suppliers do not meet the qualifications of the Specifications, the Owner or Engineer may request a change.
- B. Clay capping material, if needed for trench or cover restoration, shall be supplied by others to the working area. The clay supplier shall coordinate his/her work with the Contractor and delivery rates and anticipated clay schedule shall be agreed to prior to commencing work. Contractor must supply unit price for clay placement, and quantities will be as agreed by Engineer.
- C. Surveying of leachate collection system layout and documentation will be performed by Contractor. Contractor responsible for maintaining staking or creating offsets as necessary.
- D. Contractor responsible for hauling excavated waste to designated roll-off containers (provided by others). Waste will be returned to excavations or reconsolidated within the landfill where possible. Waste will be hauled off-site (by others) only if absolutely necessary.

1.04 WORK SEQUENCE

- A. Due to the use of the Blackwell Forest Preserve for public recreation and the amount of work to be performed, maintaining an expedited schedule for this project is critical. Prior to commencing work, the Contractor shall submit a detailed construction schedule to the Owner and the Engineer for approval.
- B. Contractor shall regulate operations, work shifts, and work force to maintain the schedule for timely completion of the project. The Owner must approve all work shifts or requests prior to working.

END OF SECTION

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SECTION 01016

HEALTH AND SAFETY CONSIDERATIONS

PART 1 - GENERAL

1.01 SECTION INCLUDES

- A. Implementing project Site Safety Plan.

1.02 UNIT PRICE - MEASUREMENT AND PAYMENT

- A. Basis of Measurement: Site Safety Plan by lump sum.
- B. Basis of Payment: Includes preparing and implementing a Contractor's project Site Safety Plan.

PART 2 - PRODUCTS

Not Used

PART 3 - EXECUTION

3.01 CONSTRUCTION

- A. The Contractor's Site Safety Plan must be in substantial conformance with the Engineer's Site Safety Plan.
- B. Contractor shall be solely and completely responsible for initiating, maintaining, and supervising all safety precautions and programs in connection with the Work. Take all necessary precautions for the safety of, and provide the necessary protection to prevent injury or loss to all Contractor's employees and Contractor's Subcontractors.

- C. Comply with all applicable OSHA regulations. The Contractor's Site Safety Plan does not supersede or in any way relieve the Contractor of obligations under any applicable OSHA regulations including 29 CFR 1910: Occupational Safety and Health Standards and 29 CFR 1926: Health and Safety Regulations for Construction.
- D. Become familiar with potential hazardous health and safety conditions and risks associated with working in or near decomposing refuse at a landfill site and take the applicable precautions for work at the project site.
- E. Contractor shall be solely responsible for determining and providing an appropriate site safety program, including monitoring, equipment, plans in event of problems and/or emergencies, and other related items as needed.
- F. Submit, for informational purposes only, a Site Safety Plan to the Engineer and Owner a minimum of two (2) weeks prior to the start of any field activities.

3.02 RESTRICTION OF SMOKING

- A. Do not smoke, at a minimum, within 100 ft of the work area.

3.03 SITE SAFETY PROGRAM

- A. Develop and implement a Site Safety Program in accordance with all applicable OSHA regulations, 29 CFR 1910 and 29 CFR 260, and any other applicable federal, state, or local agency regulations or requirements. At a minimum, the Contractor's Site Safety Plan shall include, but not be limited to the items required by OSHA 29 CFR 1910.120:
 - 1. Organizational structure.
 - 2. Comprehensive work plan.
 - 3. Hazard analysis for each site task.
 - 4. Employee training.
 - 5. Personal protective equipment to be used for each task.
 - 6. Medical surveillance.
 - 7. Frequency and types of air monitoring, personnel monitoring, and environmental sampling techniques and instrumentation to be used.

8. Site control measures.
 9. Decontamination procedures.
 10. Emergency response plan.
 11. Confined space entry procedures (if part of scope of work).
 12. Spill containment program.
- B. Provide to the Engineer, prior to the start of any field activities, certification that requirements of this Section have been met. This certification shall include:
1. Documentation of the training required under OSHA 29 CFR 1910.120 for site personnel and supervisors.
 2. Documentation of current first aid and CPR training for at least two employees per work shift.
 3. Documentation of participation of all site personnel in a medical surveillance program in accordance with OSHA 29 CFR 1910.120.
 4. Documentation that all site personnel expected to wear respiratory protection have been medically examined and approved for wearing such equipment and have been fit tested in accordance with OSHA regulations.
- C. If the Owner or Engineer observes any of the Contractor's employees or Subcontractors engaging in an unsafe act or procedure that may result in serious injury or death to the person performing the act/procedure, or to any other person, the Owner or Engineer shall have the right, but not the duty, to stop the work until the condition is corrected.

The Contractor shall be held responsible for any increased costs that result from this work stoppage.

END OF SECTION

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SECTION 01041

COORDINATION AND MEETINGS

PART 1 - GENERAL

1.01 SECTION INCLUDES

- A. Coordination
- B. Field Engineering
- C. Preconstruction Meeting
- D. Progress Meetings

1.02 COORDINATION

- A. Coordinate scheduling, submittals, and Work of the various Sections of the Specifications to assure efficient and orderly sequence of installation of interdependent construction elements, with provisions for accommodating items installed later.
- B. Verify that utility requirements and operating equipment characteristics are compatible. Coordinate work of various Sections having interdependent responsibilities for installing, connecting to, and placing in service such equipment.
- C. Coordinate completion and clean up of Work of separate Sections in preparation for Substantial Completion.
- D. Coordinate work with all Subcontractors and Suppliers.

1.03 PRE-CONSTRUCTION MEETING

- A. Owner and Engineer will schedule a meeting once U.S. EPA approval of the design is granted.

- B. Attendance Required: Owner, Engineer/Construction Manager, and Contractor.
- C. The following agenda will be addressed. Some items may be addressed prior to the pre-construction meeting based on Owner/Engineer/Contractor negotiations:
 - 1. Execution of Owner-Contractor Agreement.
 - 2. Submission of insurance certificates.
 - 3. Distribution of Contract Documents.
 - 4. Submission of list of Subcontractors, list of products, Schedule of Values, and construction schedule.
 - 5. Designation of personnel representing the Owner, Contractor, and Engineer/Construction Manager.
 - 6. Procedures and processing of field decisions, submittals, substitutions, applications for payments, proposal request, Change Orders, and contract closeout procedures.
 - 7. Review Site Safety Plans.
 - 8. Scheduling.

1.04 PROGRESS MEETINGS

- A. Engineer shall schedule and administer meetings throughout progress of the Work at maximum weekly intervals.
- B. Attendance Required: Contractor, major Subcontractors and Suppliers, Owner, Engineer/Construction Manager, as appropriate to set up agenda topics for each meeting.
- C. Proposed Agenda:
 - 1. Review minutes of previous meetings.
 - 2. Review of work progress.
 - 3. Field observations, problems, and decisions.
 - 4. Identification of problems that impede planned progress.
 - 5. Review of submittals schedule and status of submittals.
 - 6. Review of off-site fabrication and delivery schedules.
 - 7. Maintenance of progress schedule.

8. Corrective measures to regain projected schedules.
9. Planned progress during succeeding work period.
10. Maintenance of quality and work standards.
11. Effect of proposed changes on progress schedule and coordination.
12. Other business relating to Work.

1.05 PRE-FINAL INSPECTION

- A. Engineer shall schedule the Pre-Final Inspection meeting after construction is substantially complete and attendance is required by Contractor, major Subcontractors and Suppliers (as appropriate), Engineer, Owner, and the U.S. EPA.

1.06 FINAL INSPECTION

- A. Items identified as not completed during the Pre-Final Inspection shall be completed prior to the Final Inspection. Engineer should schedule the Final Inspection after all construction/installation items are complete and attendance is required by Contractor, Engineer, Owner, and the U.S. EPA.

END OF SECTION

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SECTION 01051

GRADES, LINES, AND LEVELS

PART 1 - GENERAL

1.01 SECTION INCLUDES

- A. Vertical and horizontal control for construction
- B. Layout of areas of work
- C. Location of existing utilities

1.02 QUALITY ASSURANCE

- A. All survey work shall be under the direction of the Owner's selected licensed surveyor.

PART 2 - PRODUCTS

2.01 VERTICAL CONTROL

- A. Vertical control shall be temporarily established around the site at locations to be approved by the Engineer. Existing permanent benchmarks and information will be provided by Owner.
- B. Promptly inform Owner and Engineer when a temporary benchmark has been lost, destroyed, or damaged.

2.02 AREAS OF WORK

- A. Areas of work shall be clearly marked by flagged 4-ft high wooden stakes. A brief description of the spot that the stake is marking shall be written on the post.

2.03 EXISTING UTILITIES

- A. Owner shall call the local utilities or J.U.L.I.E. at 1-800-892-0123 (Diggers Hotline service), a minimum of two weeks before starting construction to mark utilities. [The Montgomery Watson J.U.L.I.E. identification number is 9110675.]

- B. The location of the existing utilities shall be clearly marked at a minimum 100-ft intervals with flags, stakes, and paint on the ground surface, as appropriate.

PART 3 - EXECUTION

3.01 SURVEYING

- A. Owner shall perform initial staking of the following items:

1. Several temporary benchmarks around work areas
2. Compressor station and buried tank locations
3. Gas and leachate header pipe trench locations
4. Dripleg locations
5. Lift station location

- B. Owner will establish temporary benchmarks and construction locations. Protection of these benchmarks shall be the responsibility of the Contractor. If re-establishment of vertical or horizontal control is required, this shall occur at no cost to the Owner.

- C. Engineer shall coordinate documentation of construction of the following items with surveys:

1. Pipe inverts and locations of gas and leachate header pipe trenches.
2. Locations and inverts of driplegs, lift station, and buried leachate tank.
3. Pipe inverts and locations of the two liquids cutoff trench manhole connections.

END OF SECTION

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SECTION 01060

REGULATORY REQUIREMENTS

PART 1 - GENERAL

1.01 NOTIFICATIONS

- A. Give all notices; observe and comply with all laws, rules, regulations, and ordinances applicable to the Work.
- B. Owner shall notify area utility companies before beginning Work, in accordance with state and local regulations.

1.02 PERMITS

- A. Obtain and pay for all construction permits and licenses and pay all governmental charges necessary for the prosecution of the Work.

1.03 TAXES

- A. Pay all sales, consumer use, and other similar taxes required to be paid in accordance with the laws applicable to the Project site.

1.04 CONSTRUCTION REQUIREMENTS

- A. Construct in accordance with the requirements of the Administrative Order by Consent between the U.S. EPA and the Respondent, Forest Preserve District of DuPage County, Illinois, and all applicable state and federal regulations.

END OF SECTION

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SECTION 01300

SUBMITTALS

PART 1 - GENERAL

1.01 SECTION INCLUDES

- A. Progress Reports and Summary Reports
- B. Construction Observation Report
- C. Product Data

PART 2 - PRODUCTS

- A. Not Used

PART 3 - EXECUTION

3.01 PROGRESS REPORTS AND SUMMARY REPORTS

- A. Contractor shall submit weekly progress reports and monthly summary reports to the Engineer.
- B. Monthly summary reports shall contain quantities for payment as described in the technical specifications.
- C. Quantities for payment shall have been agreed upon in writing by both Contractor and Engineer.

3.02 CONSTRUCTION OBSERVATION REPORT

- A. Upon completion of the project, the Engineer shall submit a construction observation report to the Owner. Report shall cover work required to complete this project.

3.03 PRODUCT DATA

- A. Contractor shall mark each submittal copy(ies) to identify applicable products, models, options, and other data; and supplement manufacturer's standard data to provide information unique to the Work.
- B. Submit copies of data to Engineer.

END OF SECTION

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SECTION 01400

QUALITY CONTROL

PART 1 - GENERAL

1.01 SECTION INCLUDES

- A. Quality Assurance and Control of Installation
- B. Field Samples
- C. Laboratory Services
- D. Manufacturer's Field Service and Reports

1.02 QUALITY ASSURANCE/CONTROL OF INSTALLATION

- A. Monitor quality control over suppliers, manufacturers, products, services, site conditions, and workmanship to provide work of specified quality.
- B. Comply fully with manufacturing instructions, including each step in sequence.
- C. Should manufacturer's instructions conflict with Contract Documents, request clarification from Engineer before proceeding.
- D. Comply with specified standards as a minimum quality for the Work except when more stringent tolerances, codes, or specified requirements indicate higher standards or more precise workmanship.
- E. Work shall be performed by persons qualified to perform workmanship of specified quality.
- F. Work shall conform to Specifications and Construction Quality Assurance Plan (CQAP) for the LCS.

1.03 FIELD SAMPLES

- A. Sampling shall occur at the frequency and by the party identified in individual specification sections. Sampling will be performed according to American Standard Testing Materials (ASTM) and Geosynthetic Research Institute (GRI) procedures.

1.04 LABORATORY SERVICES

- A. Engineer shall employ and pay for services of a laboratory to perform required laboratory testing.
- B. Retesting required because of non-conformance with specified requirements shall be performed on instruction of the Engineer. Payment for retesting will be paid by the Contractor.

1.05 MANUFACTURER'S FIELD SERVICE AND REPORTS

- A. Submit qualifications of manufacturer's representative to Engineer 14 days in advance of required testing.
- B. When specified in individual specification sections, the Contractor shall require material or product suppliers, or manufacturers, to provide qualified staff personnel to observe site conditions; conditions of surfaces and installation; quality of workmanship; start-up of equipment; and testing, adjustment, and balance of equipment as applicable and to include instructions where necessary.
- C. The manufacturer's representative shall report observations and site decisions or instructions given to applications or installers that are supplemental or contrary to manufacturer's written instructions to the Engineer.
- D. Submit reports (weekly progress and monthly summary) in duplicate to Engineer within 30 days of observation.

END OF SECTION

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SECTION 01500

CONSTRUCTION FACILITIES AND TEMPORARY CONTROLS

PART 1 - GENERAL

1.01 SECTION INCLUDES

- A. Temporary Utilities: Electricity, telephone service, water, and sanitary facilities
- B. Temporary Controls: Barriers, enclosures and fencing, protection of the Work, and water control
- C. Construction Facilities: Construction trailer, access roads, parking, progress cleaning

1.02 RELATED SECTIONS

- A. Section 01010 - Summary of Work

1.03 TEMPORARY ELECTRICITY

- A. Temporary electricity can be obtained from by tapping into existing electrical power supply at northwest side of site near proposed compressor station.

1.04 TELEPHONE SERVICE

- A. Provide, maintain, and pay for telephone service to field office at time of project mobilization.

1.05 TEMPORARY WATER SERVICE

- A. Contractor to coordinate with Owner as to availability of water source on a daily basis.
- B. Pay cost of water used.

1.06 TEMPORARY SANITARY FACILITIES

- A. Provide and maintain required facilities and enclosures at field office.

1.07 BARRIERS

- A. Provide hazard barriers to prevent unauthorized entry to construction area and to protect existing facilities and adjacent properties from damage from construction operations.
- B. Protect stored materials, site, and structures from damage.
- C. Owner will provide hazard barriers and signs to restrict public access to the overall landfill areas during construction.

1.08 WATER CONTROL

- A. Provide temporary silt fence, swales, properly filtered sumps, and dewatering pumps and piping as necessary to provide surface water drainage to perform Work. Refer to Section 02276 for Silt Fence Specifications.
- B. Provide water barriers, silt fences, ditch checks, as required to protect site from soil erosion, flooding, puddling, and siltation as related to Work performed.

1.09 PROTECTION OF INSTALLED WORK

- A. Protect installed Work and provide special protection where specified in individual specification Sections.
- B. Provide temporary and removable protection for installed Work. Control activity in immediate work area to minimize damage.
- C. Protect finished surfaces from traffic, damage, or movement of heavy objects.

1.10 SECURITY

- A. The site is highly visible and easily accessed by others. The site is unsecured.
- B. Provide security and facilities to protect Work from unauthorized entry, vandalism, or theft.

1.11 ACCESS ROADS

- A. Extend and relocate access to Work areas as Work progress requires.
- B. Provide means of removing mud from vehicle wheels before entering Forest Preserve and public roads and streets.

1.12 PARKING

- A. Arrange for parking areas with Owner and Engineer to accommodate construction personnel. Contractor's employees shall not park their vehicles on Forest Preserve roads being used by the public.

1.13 PROGRESS CLEANING

- A. Maintain areas free of waste materials, debris, and rubbish. Maintain site in a clean and orderly condition.
- B. Remove waste materials, debris, and rubbish from site periodically and arrange for disposal.

1.14 FIELD OFFICES AND SHEDS

- A. Provide one trailer of sufficient size for use by the Engineer, Contractor, and Owner. This trailer shall be equipped with a telephone, lights, and 110V service.
- B. Trailer shall be located in the area at the northwest side of the site designated for the compressor station, or as directed by the Owner.

1.15 REMOVAL OF UTILITIES, FACILITIES, AND CONTROLS

- A. Remove temporary above grade or buried utilities, equipment, facilities, and materials prior to Final Inspection.
- B. Clean and repair damage caused by installation or use of temporary work.
- C. Restore existing facilities used during construction to original or improved condition. Restore permanent facilities used during construction to specified condition.

END OF SECTION

SECTION 01700

CONTRACT CLOSEOUT

PART 1 - GENERAL

1.01 SECTION INCLUDES

- A. Closeout Procedures
- B. Project Record Documents
- C. Warranties
- D. Release of Liens and Consent of Surety
- E. Final Payment

1.02 RELATED SECTIONS

- A. Section 01016 - Health and Safety Considerations
- B. Section 01300 - Submittals
- C. Section 01500 - Construction Facilities and Temporary Controls

1.03 CLOSEOUT PROCEDURES

- A. Submit written certification that Contract Documents have been reviewed, that Work has been inspected, and that Work is complete and in accordance with Contract Documents.
- B. Submit final Application for Payment in accordance with the General Conditions identifying total adjusted Contract Price, previous payments, and sum remaining due.
- C. No application for final payment will be accepted until all guarantees, bonds, certificates, licenses, and affidavits required for Work, or equipment as specified, are satisfactorily filed with the Engineer.

1.04 PROJECT RECORD DOCUMENTS

- A. Maintain, one set of the following Record Documents on site; record actual revisions to the work:
 - 1. Contract Drawings
 - 2. Specifications
 - 3. Addenda
 - 4. Change Orders, Contract Directives, and other modifications to the Contract
 - 5. Reviewed shop drawings and samples
- B. Record Documents shall be stored separate from documents used for construction.
- C. Record information concurrent with construction progress and submit evidence of compliance with each Payment Application.
- D. Specifications: Legibly mark and record at each product section a description of actual Products installed, including the following:
 - 1. Manufacturer's name, product model, number, and quantity(ies)
 - 2. Product substitutions or alternates utilized
 - 3. Changes made by Addenda and modifications
- E. Record Documents and Shop Drawings: Legibly mark each item to record actual construction including:
 - 1. Field changes of dimension and detail
 - 2. Details not on original Drawings
- F. Submit documents to Engineer with final Application for Payment.

1.05 WARRANTIES

- A. Provide duplicate notarized copies for all LCS components and Work.
- B. Execute and assemble documents from subcontractors, suppliers, and manufacturers.

- C. Provide Table of Contents and assemble in three ring binder with durable plastic cover.
- D. Submit prior to final Application for Payment.
- E. For items of work delayed beyond date of Substantial Completion, provide updated submittal within ten days after acceptance, listing date of acceptance as start of warranty period.

1.06 RELEASE OF LIENS AND CONSENT OF SURETY

- A. No application for final payment will be accepted until satisfactory evidence of Release of Liens and Consent of Surety to Final Payment has been submitted to the Owner.

1.07 FINAL PAYMENT

- A. Final payment will be made to the Contractor in accordance with the General Conditions.

END OF SECTION

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DIVISION 2 - TECHNICAL

SECTION 02110

CLEAR AND GRUB

PART 1 - GENERAL

1.01 SECTION INCLUDES

- A. Clearing of landfill cap areas prior to excavating for leachate collection system installation general fill material (remove trees and brush)
- B. Stockpiling of excavated trees, brush, vegetation, and any dead vegetation

1.02 UNIT PRICE - MEASUREMENT AND PAYMENT

- A. Basis of Measurement: Clear and Grub by acre or part of acre.
- B. Basis of Payment: Includes clearing landfill cap areas, removing trees and brush, and stockpiling where designated. Owner will provide disposal of tree and brush debris.

1.03 QUALITY ASSURANCE

- A. Quality Assurance shall be as approved by Engineer.

PART 2 - PRODUCTS

2.01 EQUIPMENT

- A. Equipment determined necessary by Contractor to adequately clear the work areas.

PART 3 - EXECUTION

3.01 REMOVAL

- A. Remove designated trees, brush, and vegetation from landfill cap areas and stockpile where Owner designates.

END OF SECTION

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SECTION 02220

EXCAVATING, BACKFILLING, AND COMPACTING

PART 1 - GENERAL

1.01 SECTION INCLUDES

- A. Excavating, backfilling, and compacting of pipe trenches including gas header piping, and excavations requirements.
- B. Excavating, backfilling, and compacting for refuse and excess soils reconsolidation area(s).

1.02 RELATED SECTIONS

- A. Section 02684 - Horizontal Pipe Construction
- B. Section 02733 - Lift Station
- C. Section 15122 - Pipe Specialties
- D. Section 15177 - Underground Leachate Holding Tank

1.03 UNIT PRICE - MEASUREMENT AND PAYMENT

A. Basis of Measurement

1. Pipe trenches (excavation and backfill) by lineal foot which includes the gas header pipe cost. Other pipes are included as separate unit price items (Section 02684) by lineal foot, and include leachate gravity conveyance pipe, leachate pressure conveyance pipe, and compressed air supply line.
2. Refuse shall be returned to excavations where possible. Excess refuse and soils shall be reconsolidated in an area(s) directed by the Engineer and price shall be by cubic yard of materials reconsolidated.

B. Basis of Payment:

1. Pipe trenches: Includes excavating, placing pipe bedding, providing and placing gas header pipe, placing and compacting of backfill, yellow ribbon, and repair of the landfill cover. Other trench located facilities described in Section 15122.
2. Excess refuse and soils shall be placed and compacted beneath existing landfill cap at a location(s) directed by Engineer. Cost includes preparation of area(s), reconsolidation, and restoration. The clay cap must be restored properly as defined in this Section.

1.04 REFERENCES

- A. ASTM C136 - Method for Sieve Analysis of Fine and Coarse Aggregates.
- B. ASTM D422 - Standard Test Method for Particle-Size Analysis of Soils.
- C. ASTM D1557 - Test Method for Laboratory Compaction Characteristics of Soil using Modified Effort (56,000 ft-lbf/ft³ (2,700 KN-m/m³).
- D. ASTM D2216 - Standard Method for Laboratory Determination of Water (Moisture) Content in Soil, Rock, and Soil-Aggregate Mixtures.
- E. ASTM D2487 - Standard Test Method for Classification of Soils for Engineering Purposes.
- F. ASTM D2922 - Standard Test Methods for Density of Soil and Soil-Aggregate in Place by Nuclear Methods (Shallow Depth).
- G. ASTM D3017 - Standard Test Method for Water Content of Soil and Rock in Place by Nuclear Methods (Shallow Depth).
- H. ASTM D4318 - Standard Test Method for Liquid Limit, Plastic Limit, and Plasticity Index of Soils.

1.05 QUALITY ASSURANCE

- A. Engineer shall test (borrow pit) clay soils for index properties every 5,000 cubic yards (cy) brought to site (one test minimum), and will observe that clay material is compacted to the proper density.

PART 2 - PRODUCTS

2.01 MATERIALS

A. Select Granular Fill (Pipe Bedding)

1. Select granular fill (for pipe bedding) as defined with a maximum P200 content of 20% and more than 90% passing the No. 4 U.S. sieve size. Generally classified as sand.

B. Excavated existing clay cap material will be reused during cover restoration. If existing clay soils are determined unsatisfactory by the Engineer, additional clay material shall be obtained from an off-site source (supplied by Owner) and will be transported to the working face by others.

C. Compacted clay (if imported only) (trench 2-ft minimum backfill and Lift Station and Dripleg DL02 backfill) shall consist of material meeting the following specifications:

1. A Unified Soil Classification System (ASTM D2487) designation of CL-ML, CL, or CH.
2. Moisture content wet of optimum value from modified Proctor curve at time of placement.
3. Compaction to 90% of modified Proctor maximum dry density or greater.

D. Plastic Warning Ribbon above pipe trenches/excavations

1. Plastic warning ribbon shall be 3 in. wide, color-yellow.

2.02 EQUIPMENT

A. Vibratory padfoot compactor, or as appropriate.

B. Hand compaction equipment for compacting clay around penetrations and trenches.

C. Equipment determined necessary by Contractor to adequately spread, condition, and grade clay.

PART 3 - EXECUTION

3.01 PREPARATION

- A. Identify required lines, levels, contours, and datum.
- B. Protect bench marks and survey layout stakes from excavation equipment and vehicular traffic.
- C. Pipe construction shall be as specified in Section 02684.
- D. Engineer shall observe surface of subbase fill layer to confirm that no materials are present that could prevent proper placement of the compacted clay capping layer.

3.02 EXCAVATION OF TRENCHES

- A. Excavate to the lines and grades shown on the Drawings.
- B. Abide by all OSHA excavation and trenching regulations, and pertinent other Federal, State, and Local requirements.
- C. Excavate for inlet and outlet structures to provide a minimum clearance of 12 in. from vertical surfaces to face of excavation.
- D. Grade top perimeter of excavation to prevent surface water from draining into excavation.
- E. Notify Engineer of unexpected subsurface conditions and discontinue affected work in area until notified to resume work.
- F. Remove unstable material and replace with general fill, as directed by Engineer.
- G. Correct unauthorized excavation at no extra cost to Owner.
- H. Correct areas over-excavated by error at no additional cost to Owner.
- I. Stockpile and segregate excavated soil or refuse adjacent to trench.

3.03 PREPARATION FOR BACKFILL

- A. Compact subgrade to density requirements specified.
- B. Undercut soft areas of excavations/trenches a minimum of 6 in. and backfill with general fill. Compact to a density equal to or greater than the requirements specified.

3.04 BACKFILLING

- A. Backfill areas to required contours and elevations with unfrozen materials.
- B. Do not backfill over standing water or frozen or spongy subgrade surfaces.
- C. Pipe bedding:
 - 1. Spade or shovel-slice pipe bedding material under the pipe haunches.
 - 2. Place pipe and bedding to depth shown on the Drawings.
 - 3. Backfill with remaining specified material above pipe bedding.
- D. Maintain optimum moisture content of backfill materials to attain required compaction density.
- F. Make grade changes gradual. Blend slope into level areas. Maintain positive drainage and control erosion.

3.05 CLAY PLACEMENT

- A. Place material to the depths indicated above and on Drawing details in lifts parallel to the surface. Do not exceed compacted lift thickness of 6 in. and compact to required density. Break apart clay clods and knead together.
- B. Moisture conditioning of too dry clay (too wet clay will be dried at the borrow source by the clay supply contractor; some drying may be necessary) and placement of material within limits of clay placement as directed by the Engineer. Maintain moisture content of compacted soil to prevent desiccation by periodically spraying soils with water, if necessary.
- C. Compact material on the wet side of optimum as determined by ASTM D1557.
- D. Remove excessively dry or wet clay before placement of additional lifts.
- E. Knead each lift into previously placed lift, or scarify previous lift prior to placing subsequent lifts to achieve bonding between lifts.

- F. Place clay while air temperatures are above 32°F, unless otherwise approved by the Engineer. Do not place any frozen material.
- G. Seal clay surface or cover with remaining backfill at the completion of each working day to prevent moisture infiltration.
- H. Maintain nominal slope for positive drainage.

3.06 RESTORATION

- A. Restore site surfaces for positive drainage.

3.07 TOLERANCES

- A. Construct backfilled trenches to tolerance of plus 2 in..
- B. Construct backfilled open areas, drainage swales and berms to tolerance of plus or minus 3 in.

3.08 FIELD QUALITY CONTROL

- A. Field observation and testing shall be performed by Engineer.
- B. Tests and analysis of fill material may be performed in accordance with ASTM C136 or ASTM D422, as appropriate.
- C. Engineer shall confirm compactive effort used for compacted clay capping layer placed within the limits of construction on an approximate 100-ft grid (minimum of five tests per acre) for each 12-in. thickness placed (placed as two 6-in. lifts), or at 100 lf intervals along pipe trenches. Compactive effort shall be tested using nuclear methods (ASTM D2922 and D3017).
- D. Refer to Construction Quality Assurance Plan (CQAP) for additional information.

3.09 CLAY CAP PENETRATIONS

- A. Backfill the following in the compacted clay layer:
 - 1. Nuclear density probe locations.
 - 2. Other perforations/disturbances as directed by Engineer.

B. Backfill Material:

1. Backfill penetrations with granular bentonite, unless otherwise directed by Engineer.
2. Contractor shall provide granular bentonite.

END OF SECTION

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SECTION 02276

SILT FENCE

PART 1 - GENERAL

1.01 SECTION INCLUDES

- A. Supply, install, maintain, and remove silt fence.

1.02 RELATED SECTIONS

- A. Section 01500 - Construction Facilities and Temporary Controls

1.03 UNIT PRICE - MEASUREMENT AND PAYMENT

- A. Basis of Measurement: Silt fence by lineal foot installed.
- B. Basis of Payment: Includes supplying, installing and maintaining silt fence to locations shown on Drawings.

1.04 DEFINITIONS AND REFERENCES

- A. ASTM D4355 - Standard Test Method for Deterioration of Geotextiles from Exposure to Ultraviolet Light and Water (Xenon - Arc Type Apparatus).
- B. ASTM D4491 - Standard Test Methods for Water Permeability of Geotextiles by Permittivity.
- C. ASTM D4632 - Standard Test Method for Grab Breaking Load and Elongation of Geotextiles.
- D. ASTM D4751 - Standard Test Method for Determining Apparent Opening Size of a Geotextile.

PART 2 - PRODUCTS

2.01 MATERIALS

- A. Silt fence shall consist of woven geotextile secured to 4-ft long, 1-½ in. by 1-½ in. hardwood posts on 7-ft centers with tension nylon cording and reinforcing net.
- B. Woven geotextile properties shall meet the following minimum average roll values:

<u>Property</u>	<u>Units</u>	<u>Value</u>	<u>Test</u>
Tensile Strength	lb	90	ASTM D4632
Apparent Opening Size (AOS)	NA	No. 20	ASTM D4751
Permittivity	sec ⁻¹	0.01	ASTM D4491
Ultraviolet Degradation	% strength retained after 500 h exposure	70	ASTM D4355

- C. Reinforcing net shall be industrial polypropylene with maximum mesh spacing of 3/4 in.
- D. Wire staples shall be 1.5 in. minimum length No. 9 staples.

PART 3 - EXECUTION

3.01 INSTALLATION

- A. Install silt fence around all affected drainage outlets and around areas of construction as directed by Engineer.
- B. Dig a 6 in. by 6 in. trench at these locations.
- C. Drive hardwood posts 12 in. deep, 7-ft centers, below base of trench on the downslope of the trench.
- D. Securely fasten the tension nylon cording and reinforcing net to the posts.
- E. Stretch geotextile tight between posts.
- F. Staple geotextile to posts with wire staple.

G. Drop geotextile in trench and cover with excavated soils and compact.

3.02 MAINTENANCE

A. Inspect silt fence after every rainfall event.

B. Correct any deficiencies.

C. Remove excessive sediment deposits as determined by Engineer.

D. Replace damaged silt fence at no cost to Owner. Engineer shall determine damaged silt fence.

END OF SECTION

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SECTION 02505

AGGREGATE PAVING

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Compacted crushed aggregate paving materials (surface and base course) for compressor station/tank loadout access and lift station access road areas.

1.02 UNIT PRICE - MEASUREMENT AND PAYMENT

- A. Basis of Measurement: By square yard.
- B. Basis of Payment: Includes supplying, placing, and compacting material at lift station and compressor station/tank areas. Materials include surface course and base course aggregates.

1.03 DEFINITIONS AND REFERENCES

- A. ASTM C136 - Standard Method for Sieve Analysis of Fine and Course Aggregates.
- B. ASTM D1557 - Test Method for Laboratory Compaction Characteristics of Soil Using Modified Effort (56,000 ft-lbf/ft³(2,700 kN-m/m³)).

1.04 SUBMITTALS

- A. Provide Engineer with written documentation that crushed aggregate used for access areas meets the material specifications in Part 2.

1.05 QUALITY ASSURANCE

- A. General: Provide a smooth final surface of uniform density conforming to required grade and cross section.

B. Density: Compact the subgrade to the degree that there will be no appreciable displacement of the material laterally or longitudinally under the compaction equipment.

C. Aggregate Thickness

1. Construct to compacted thickness indicated on Drawings.
2. Thickness deficiency greater than 1/2 in. shall be corrected by placing additional crushed aggregate.

D. Surface Smoothness

1. Check surface smoothness at intervals directed by Engineer.

E. Testing to confirm crushed aggregate thickness, line, grade, gradation, soundness, abrasion resistance, and/or degree of compaction may be performed at the discretion of the Engineer or Owner.

1.06 JOB CONDITIONS

A. Weather Limitation

1. Do not place crushed aggregate on frozen subgrade or subgrade covered with ice or snow.
2. Do not place crushed aggregate on excessively wet subgrade.
3. Do not place crushed aggregate on dry and dusty subgrade. An excessively dry subgrade shall be watered, and shall be reworked or recompact, if necessary.

PART 2 PRODUCTS

2.01 CRUSHED AGGREGATE (SURFACE COURSE)

A. Crushed aggregate material shall meet the following gradation requirements or equivalent. This material shall be used also for lift station backfill - Section 02733.

Percent by Weight Passing

<u>U.S. Standard Sieve Size</u>	<u>Crushed Gravel</u>	<u>Crushed Stone</u>
1½ Inch	100%	100%
1 Inch	75-100	-
¾ Inch	-	-
3/8 Inch	40-75	30-65
No. 4	30-60	25-55
No. 10	20-45	15-40
No. 40	10-30	-
No. 200	3-10	2-12

- B. The aggregate shall consist of hard, durable particles of crushed stone or crushed gravel and a filler of natural sand, stone sand, or other finely divided mineral matter. The composite material shall be substantially free from vegetable matter, shale, and lumps of clay.

2.02 BASE COURSE MATERIAL

- A. Base course material shall be 3-in. crushed aggregate material with fines (i.e., 3-in. breaker run). The composite material shall be substantially free from vegetable matter, shale, and lumps of clay.

2.03 EQUIPMENT

- A. The weight, type, capacity, and method of operation of all hauling, spreading, and compacting equipment shall be such that no damage will result to the subgrade or aggregate in place. Spreading equipment shall not significantly segregate the aggregate.

PART 3 EXECUTION

3.01 LINES AND GRADE

- A. The lines, grade, and cross section shall be constructed as shown on the Drawings or as directed by the Engineer or Owner.

3.02 EXAMINATION

- A. Engineer shall confirm that compacted subgrade is firm and ready to receive work by visual observation during proof-rolling.

3.03 SURFACE PREPARATION

- A. Strip topsoil and other soils as needed to reach subgrade.
- B. Fill any ruts or depressions prior to aggregate placement.
- C. Grade for positive drainage.

3.04 PLACEMENT OF CRUSHED AGGREGATE PAVING

- A. After placement and compaction of base course aggregate, place surface course aggregate and compact to minimum thicknesses as indicated on Drawings.
- B. Construct access areas to the lines and grades shown on Drawings.
- C. Compact placed aggregate material to a minimum density of 90% of the maximum dry density determined by modified Proctor (ASTM D1557) to full depth. Segregation of material shall not be permitted.
- D. Add water if required to assist compaction. If there is excess water, rework topping and aerate to reduce moisture content.
- E. Perform hand tamping in areas inaccessible to self-propelled or tow-behind compaction equipment.
- F. Do not place crushed aggregate on frozen subgrade or subgrade covered with ice or snow.
- G. Do not place crushed aggregate on excessively wet subgrade.

3.05 TOLERANCES

- A. Access areas shall be constructed to a thickness tolerance of plus 6 in.

3.06 QUALITY CONTROL

- A. Engineer may collect samples of crushed aggregate for laboratory testing.
- B. Engineer shall survey the final access areas for grade.

END OF SECTION

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SECTION 02684

HORIZONTAL PIPE CONSTRUCTION

PART I GENERAL

1.01 SECTION INCLUDES

- A. Supply and install leachate gravity conveyance pipe
- B. Supply and install leachate pressure conveyance pipes
- C. Supply and install header risers/cleanouts including blower riser
- D. Supply and install compressed air line
- E. Supply and install control wires

1.02 RELATED SECTIONS

- A. Section 02220 - Excavating, Backfilling, and Compacting
- B. Section 16900 - Instrumentation and Control System

1.03 UNIT PRICE - MEASUREMENT AND PAYMENT

A. Basis of Measurement:

- 1. Leachate gravity conveyance pipe by lineal foot of pipe installed
- 2. Leachate pressure conveyance pipe by lineal foot of pipe installed.
- 3. Header risers/cleanouts (includes blower riser) by each.
- 4. Compressed air line by lineal foot of pipe installed.
- 5. Control wires by lineal foot of wire installed.

Note that the gas header pipe is included with trenching costs (Section 02220).

B. Basis of Payment:

1. Leachate gravity conveyance pipe includes supplying and installing pipe.
2. Leachate pressure conveyance pipe includes supplying and installing pipe.
3. Header risers/cleanouts includes supplying and installing pipe.
4. Compressed air line includes supplying and installing pipe.
5. Control wires include supplying and installing an individual control wire from each well and lift station pump, in the pipe trench, to the control building.

1.04 DEFINITIONS AND REFERENCES

- A. ASTM D3350, PE 34543C - Polyethylene plastic pipe and fittings materials. HDPE pipe and fittings.
- B. ASTM D1248 PE 3408 - Polyethylene plastic moldings and extraction materials. HDPE pipe and fittings.
- C. ASTM D3261 - Butt heat fusion polyethylene (PE) plastic fittings for polyethylene (PE) plastic pipe and tubing.

1.05 SUBMITTALS

- A. Furnish to Engineer the Manufacturer's product literature, including but not limited to dimensions, sizes, seals, and connections, pressure rating and installation instructions.
- B. No fabrication or ordering shall occur until shop drawings are reviewed by the Engineer.

1.06 QUALITY ASSURANCE

- A. All pipe, fittings, wire, and wire hardware, shall be new and unused.
- B. Each length of pipe shall be clearly marked with Manufacturer's name, the type and class of pipe.

- C. A guarantee of one year minimum after acceptance by Owner of all equipment, materials, and workmanship to be free from defect and that the system will operate without excessive noise, vibration, or uncontrolled expansion.
- D. Replacement or repair shall be at no cost to Owner.

PART 2 PRODUCTS

2.01 PIPE MATERIAL

- A. All piping shall be sized as shown on the Drawings.
- B. HDPE pipe and fitting shall be SDR 17 (or lower SDR) Driscopipe 6400 high density polyethylene, conforming to ASTM D-1248, PE 3408 and ASTM D-3350, PE 3453C, or other as approved. Joints shall be butt fused in conformance with ASTM D-3261 and pipe manufacturer's recommendations. Connections to existing HDPE piping can be made by computer controlled electrofusion method and equipment as manufactured by Central Plastics Company or equal.
- C. All flange connections shall be made with full face neoprene gaskets.

2.02 PIPE BEDDING MATERIAL

- A. Header pipe bedding material shall be pipe bedding as specified in Section 02220 - Excavating, Backfilling, and Compacting.

2.03 CONTROL WIRES

- A. Control wires materials shall be as specified in Section 16900 - Instrumentation and Control Systems and per supplier's recommendations, all subject to Engineer approval.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Engineer shall document that pipe trenches are suitable for placement of pipe.

- B. Prior to installation and backfill, sections of all piping (including gas header) shall be pressure tested. A pressure of 3.0 psig shall be applied to the pipe and after 30 min show a pressure drop of no more than 5% and to be accepted by the Engineer. Leakage and pressure tests shall be performed in the presence of the Engineer or Owner. Contractor shall give 48 hr notice to Engineer prior to testing. A written report shall be prepared by the Engineer and signed by the Contractor for each test. Contractor shall provide all gauges, pumps, pipe, connections, and all other necessary apparatus to conduct tests. If results of tests performed do not conform to requirements as stated herein, Contractor shall make the necessary repairs and repeat tests as required until satisfactory results are obtained.

3.02 LINES AND GRADE

- A. All pipe shall be laid to the lines and grades shown on the drawings or given by the Engineer. The Contractor shall be responsible for the preservation of stakes when set and, if disturbed, shall pay the actual cost of having stakes reset.
- B. The Contractor shall notify the Engineer at least 48 hr in advance of the need for line and grade stakes.
- C. All fittings, valves and appurtenances shall be located as shown on the Drawings or as directed by the Engineer.

3.03 INSTALLATION

- A. All pipes shall be fully protected to prevent earth or other substances from entering the pipe. Not more than 200 ft of trench shall be opened in advance of pipe laying unless permitted by the Engineer.
- B. The extraction trenches shall be constructed according to the Drawings and specifications Section 02220 - Excavating, Backfilling, and Compacting. Extraction trench construction includes trench riser pipe to the point of wellhead connection.
- C. The gas header pipes, and the two driplegs shall be installed according to the Drawings and Specifications Section 02220 - Excavating, Backfilling, and Compacting. Gas header pipe includes riser pipe to the point of wellhead connection and header pipe to the buried leachate tank and blower riser. The gas and leachate header pipe also includes the cleanouts. Each cleanout and gas header riser includes an HDPE blind flange with a full face neoprene gasket.
- D. Install HDPE pipe with fusion joints.

- E. Shovel-slice pipe bedding around haunches of gas header pipe.
- F. All header pipe will be surveyed by the Engineer for location and elevation prior to backfill.
- G. Header pipe connections to related system equipment shall be in accordance with Section 15122 - Pipe Specialties.
- H. Trench construction, pipe installation, bedding, and backfilling shall be performed from the ground surface and includes use of the existing vaults at each well. The vaults are currently in-place at each well top. The wellheads must be installed properly within the vaults as per Contractors' means and methods.
- I. Repair cover system as necessary, including installation of the surface vaults, in accordance with Section 02223 - Compacted Clay and Section 02220 - Excavating, Backfilling, and Compacting.
- J. After construction, flush all pipes with clean water to remove construction debris.

3.04 TOLERANCES

- A. On the vertical plane, pipe inverts shall be installed to a tolerance of plus or minus 0.1 ft from that shown on the drawings or as directed by the Engineer. Pipe slopes shall not be less than 3% in the direction shown on the Drawings.
- B. On the horizontal plane, all pipe shall be installed to a tolerance of plus or minus 1.0 ft.

3.05 FIELD QUALITY CONTROL

- A. Engineer may collect samples of pipe bedding for laboratory testing.
- B. Engineer shall document pipe invert elevation at every pipe connection and coordinates at all pipe corners, bends, and grade changes.
- C. Engineer shall document pipe pressure tests.

END OF SECTION

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SECTION 02733

LIFT STATION

PART 1 - GENERAL

1.01 SECTION INCLUDES

- A. Supply and install lift station complete with sump, pump, piping, control system, and other appurtenances

1.02 RELATED SECTIONS

- A. Section 02220 - Excavating Backfilling, and Compacting
- B. Section 02684 - Horizontal Pipe Construction
- C. Section 02505 - Aggregate Paving

1.03 UNIT PRICE - MEASUREMENT AND PAYMENT

- A. Basis of Measurement: Lift station by lump sum, including access road subbase.
- B. Basis of Payment:
 - 1. Supply and install sump, pump, piping, control system, and other appurtenances including excavation and backfill for lift station and for access road subbase.
 - 2. Place and compact clay by cubic yard of compacted clay to a minimum depth of 2 ft below and around lift station (if clay liner is compromised) to the top of the existing clay liner as shown on Drawings for lift station. A survey by a licensed surveyor, and the Engineer and Contractor shall determine the volume of compacted clay.
 - 3. Access road subbase material shall be excess suitable soils from LCS construction or as supplied by Owner.

1.04 SUBMITTALS

- A. Submit product data to Owner at least ten days prior to installation.

1.05 QUALITY ASSURANCE

- A. Quality assurance shall be as approved by Engineer.

PART 2 - PRODUCTS

2.01 MATERIALS

A. Lift Station

Lift station to include:

1. One pneumatic submersible pump: QED Solo II Model No. SP4000 with tubing package model No. SPTUBE, or Anchor Pump Model No. 102
4. A check valve, isolation valve, access valve, and tank truck loadout pipe.
5. The lift station pump and associated equipment shall be supplied by Water Tek Services (QED) or Bertane (Blackhawk), or approved equivalent by Engineer.
6. Sump shall be SDR-11 HDPE 24-in. diameter pipe and as shown on the Drawings supplied by Lakeside Pipe, or approved equal.

B. Valves and Fittings

1. The condensate isolation valve shall be ASAHI/AMERICA Type 75 resistant sealed flanged joint butterfly valves, or approved equal by Engineer.

Valves shall consist of PVC body, polypropylene disc and seal, bubble tight, at rated pressure with only the liner and disc as wetted parts. The disc and seal, bubble tight, at reacted pressure with only the liner and disc as wetted parts. The disc shall have double "O" ring seals on top and bottom trunnions, of the same material as the valve liner. Liner shall be molded and formed around the body functioning as a gasket on each side of the valve. Stem extensions shall be of two-piece stem and housing construction with a gear style handle and have engagement over the full length of the disc valve. Seats and seals shall be Viton. Valves shall be satisfactory for application involving both frequent and infrequent operation. Valve sizes shall be as noted on Drawings.

2. The quick-connect fittings for the 4-in. dia loadout pipe shall be of aluminum construction with Teflon seals. A 4-in. dia threaded male NPT adapter with an air-tight dust cap capable of operating under pressure and vacuum requirements of the system shall be installed as indicated on the Drawings.

C. Electrical Controls

1. The lift station pump will be operated with the same compressed air supply line as that feeding the wells pumps and controlled from the compressor building.
2. The liquid volume pumped from the lift station shall be metered using a pump stroke counter (as part of a bubbler/liquid level system) and the meter shall include the capability to transmit the pump counter value to the control/compressor building.

PART 3 - EXECUTION

3.01 PREPARATION

- A. Excavate and backfill in accordance with this section and Section 02220.

3.02 INSTALLATION

- A. Install sump, pump, piping, and accessories to provide for removal of pump for maintenance without entering manhole.
- B. Install according to manufacturer's recommended instructions.

3.03 INSPECTION

- A. Check, align, inspect before start-up.
- B. Start-up and field test the completed installation prior to final completion.
- C. The sump and related piping shall be pressur tested following the same criteria inciated in Section 02684 - Horizontal Gas Pipe Constrcution prior to installation.

END OF SECTION

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SECTION 02831

CHAIN LINK FENCES AND GATES

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Supply and install fence, poles, foundations, and gates

1.02 UNIT PRICE - MEASUREMENT AND PAYMENT

- A. Basis of Measurement: By lineal foot.
- B. Basis of Payment: Includes excavation and concrete for posts, posts, rails, top rails, fabric, barbed wire, accessories, attachments, hardware, and installation. Fence shall be installed around compressor/tank area as shown on Drawings.

1.03 DEFINITIONS AND REFERENCES

- A. ASTM A120 - Pipe, Steel, Black and Hot-Dipped Zinc-Coated (Galvanized) Welded and Seamless. For Ordinary Uses.
- B. ASTM A123 - Zinc (Hot Galvanized) Coatings of Products Fabricated from Rolled, Pressed, and Forged Steel Shapes, Plates, Bars and Strips.
- C. ASTM A392 - Zinc-Coated Steel Chain-Link Fence Fabric.
- D. ASTM F567 - Installation of Chain-Link Fence.
- E. ASTM C94 - Ready-Mixed Concrete.

1.04 SUBMITTALS

- A. Submit shop drawings and product data.
- B. Include plan layout, grid, spacing of components, accessories, fittings, hardware, anchorages, and schedule of components.

- C. Submit manufacturer's installation instructions.

1.05 QUALITY ASSURANCE

- A. Manufacturer: Company specializing in commercial quality chain link fencing with at least two years experience.
- B. Installation: ASTM F567.

1.06 LAYOUT

- A. Owner will perform layout for locations of fencing and gates.

PART 2 PRODUCTS

2.01 MATERIALS

- A. Framework: ASTM A120; Schedule 40 steel pipe.
- B. Fabric: Type ASTM A392, zinc-coated steel.

2.02 CONCRETE MIX

- A. Concrete: ASTM C94; normal Portland Cement; 2500 psi at 28 days; 3 inch slump; 1 1/2 in. sized aggregate.

2.03 COMPONENTS

- A. Line Posts: 2 in. O.D. steel pipe.
- B. Corner and Terminal Posts: 2-1/2 in. O.D. steel pipe.
- C. Gate Posts: 4 in. O.D. steel pipe.
- D. Top and Brace Rail: 1-5/8 in. O.D., plain end, sleeve coupled steel pipe.
- E. Gate Frame: 2 in. O.D. diameter steel pipe for welded fabrication.
- F. Fabric: 2 in. diamond mesh steel wire, interwoven, 9 gage thick, top selvage twisted tight, bottom selvage knuckle end closed.

- G. Caps: Cast steel or malleable iron, galvanized; sized to post dimension, set screw retained.
- H. Fittings: Sleeves, bands, clips, rail ends, tension bars, fasteners and fittings: Steel.
- I. Tension Wire: 7 gage steel, single strand. Top of fence to have a pipe rail and 3 strands of barbed wire angled outward.
- J. Gate Hardware: Fork type latch with gravity drop for single leaf; Center gate stop and drop rod for double leaf; Mechanical keepers; Three 180 degree gate hinges per leaf and hardware for padlock.

2.04 FINISHES

- A. Galvanized Pipe: ASTM A123; 1.8 oz/sf coating.
- B. Galvanized Fabric - ASTM A123; 1.2 oz/sf coating.
- C. Accessories: Same finish as framing, including barbed wire.
- D. All fence pipe, fabric and accessories shall be coated with heavy gauge black vinyl.

PART 3 EXECUTION

3.01 INSTALLATION

- A. Install framework, fabric, accessories and gates in accordance with ASTM F567 in locations as indicated on Drawings.
- B. Provide fence 8 ft nominal height at location shown on Drawings.
- C. Provide gate 24-ft wide at compressor/tank station.
- D. Space line posts at intervals not exceeding 10 ft.
- E. Set all line posts below finish grade in accordance with ASTM F567 requirements.

- F. Set all corner, terminal, and gate posts plumb in concrete footings with top of footings 2 in. above finish grade. Slope top of concrete away from post. Provide footings as follows:

Corner and Terminal Posts - 9 in. diameter by 36 in. depth.

Gate Posts - 18 in. diameter by 36 in. depth.

- G. Provide top brace pipe rail at fence top follow by 3 standards of barbed wire angled outward.
- H. Brace each gate and corner post back to adjacent line post with horizontal center brace rail and diagonal truss rods. Install brace rail, one bay from end and gate posts.
- I. Install center and bottom brace rail on corner and gate leaves.
- J. Stretch fabric between terminal posts or at intervals of 100 ft maximum, whichever is less.
- K. Position bottom of fabric at finished grade where possible.
- L. Provide tension wire as necessary.
- M. Attach fabric to end, corner, and gate posts, and top brace rail, with tension bars and tension bar clips.
- N. Install all tension wires stretched taut between terminal posts.
- O. Provide concrete center drop to foundation depth and drop rod retainers at center of double gate openings.

3.02 FIELD QUALITY CONTROL

- A. Engineer shall survey installed fence and gates at each corner post.

END OF SECTION

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SECTION 03300

CAST-IN-PLACE CONCRETE

PART 1 GENERAL

1.01 DESCRIPTION

A. Provide cast-in-place concrete foundation for compressor station building and ballast for buried leachate holding tank.

B. Scope

1. Provide all materials, labor, services and incidentals necessary for completion of the Work.
2. Cast-in-place concrete required for this Work is indicated on the Drawings and includes, but is not necessarily limited to:
 - a. Foundation (slabs and footings as necessary)
 - b. Deadweights for buried tank ballast
3. All steel reinforcing and formwork related to cast-in-place concrete and sand bedding layers.
 - a. Reinforcement for building foundation shall be as specified by supplier.
 - b. Reinforcement for deadweights shall be two No. 4 steel reinforcement bars the full length of each.

C. Description of Requirements

1. Cast-in-place concrete Work shall be in accordance with the requirements of ACI 301-"Specifications for Structural Concrete for Buildings" except as modified herein.

1.02 RELATED SECTIONS

A. Section 15122 - Pipe Specialties

B. Section 02505 - Aggregate Paving

1.03 QUALITY ASSURANCE

- A. Provide at least one person who shall be present at all times during execution of this portion of the Work and who shall be thoroughly familiar with the type of materials being installed, the referenced standards, and the requirements of this Work, and who shall direct all Work performed under this Section.
- B. Redi-Mix Concrete Supplier: Employing experienced personnel regularly engaged in producing redi-mix concrete.
- C. Engineer may, at his discretion, make concrete test cylinders in accordance with ACI 301, so as to provide a strength test at the expense of Owner. Contractor shall coordinate with and assist Engineer as needed for the making of test cylinders.
- D. Codes and Standards:
 - 1. All referenced standards are to be of their most recent edition.
 - 2. In addition to complying with all pertinent codes and regulations, comply with all pertinent recommendations contained in "Recommended Practice for Concrete Formwork" publication ACI 347 of the American Concrete Institute, "Manual of Standard Practice for Detailing Reinforced Concrete Structures," publication ACI 315 of the American Concrete Institute; and "Structural Concrete for Buildings", publication ACI 301 of the American Concrete Institute.
 - 3. Where provisions of pertinent codes and standards conflict with the requirements of this Section of these Specifications, the provisions requiring the higher level of performance shall govern.

1.03 SUBMITTALS

- A. Submit proposed mix designs and supporting data to the Engineer for approval at least 10 days before the start of any concrete Work, if requested by Engineer.
- B. Transit-Mix Delivery Slips:
 - 1. Keep a record at the job site showing time and place of each pour, together with transit-mix delivery slip certifying contents of the pour.

2. Make the record available to the Engineer for his inspection upon request.

1.04 PRODUCT HANDLING

A. Protection:

1. Use all means necessary to protect formwork, concrete reinforcement, and cast-in-place concrete materials before, during, and after installation, and to protect the installed Work and materials of all other trades.

B. Replacements:

1. In the event of damage, immediately make all repairs and replacements necessary to the satisfaction of the Engineer and at no additional cost to the Owner.

PART 2 PRODUCTS

2.01 FORM MATERIALS:

A. Form Lumber:

1. Wood: Clean straight lumber, dressed on face and edges, 1 in. nominal thickness.
2. Plywood: 5/8" or 3/4" thick, EXT-DFPA.
3. Metal: Smooth, as large size as possible.

B. Form Sealers:

1. All form sealers shall be first-quality of their respective kinds and subject to the approval of the Engineer.

2.02 TIES AND SPREADERS:

A. Type:

1. All form ties shall be a type that does not leave an open hole through the concrete, and which permits neat and solid patching at every hole.

B. Design:

1. When forms are removed, all metal shall be not less than 1" from the surface.

C. Wire ties and wood spreaders:

1. Do not use wire ties and wood spreaders.

2.03 ALTERNATE FORMING SYSTEMS

- A. Alternate forming systems may be used subject to the advance approval of the Engineer.

2.04 CONCRETE REINFORCEMENT

- A. All concrete reinforcement materials shall be new, free from rust, and comply with the following reference standards:

1. Bars for reinforcement: ASTM A615 Grade 60
2. Wire for reinforcement: ASTM A82

2.05 CONCRETE

A. General:

1. All concrete, unless otherwise specifically permitted by the Engineer, shall be transit-mixed in accordance with ASTM C-94.

B. Mixes:

1. Mixture proportions: Chapter 3, ACI 301.
2. All concrete shall have a minimum compressive strength of 4000 psi within 28 days. Maximum slump shall be 4 inches.
3. Air Entraining Admixtures: Use in all concrete - ASTM C 260. Air entrained concrete shall contain 4% to 6% air by volume.
4. All cement shall be Portland Cement conforming to ASTM C150, Type I and shall be the product of one manufacturer.
5. All aggregates shall conform to ASTM C33.
6. All water shall be clean and free from deleterious matter.
7. Minimum cement content; 6 bags per cubic yard.

2.06 NON-SHRINK GROUT

- A. Premixed compound with non-metallic aggregate, cement, water reducing and plasticizing agents; capable of minimum compressive strength of 2,400 psi.

2.07 OTHER MATERIALS

- A. All other materials, not specifically described but required for proper completion of all cast-in-place concrete, shall be as selected by the Contractor subject to the advance approval of the Engineer.

PART 3 EXECUTION

3.01 INSPECTION

- A. Prior to all Work of this Section, carefully inspect the installed Work of all trades and verify that all such Work is complete to the point where this installation may properly commence.
- B. Verify that all items to be embedded in concrete are in place.
- C. Do not proceed with installation in areas of discrepancy until unsatisfactory conditions are corrected.

3.02 FORMWORK

A. General

1. Construct forms in accordance with ACI 347.
2. Construct all required forms to be substantial, sufficiently tight to prevent leakage of mortar, and able to withstand excessive deflection when filled with wet concrete.
3. Form for all required cast-in-place concrete to the shapes, sizes, lines and dimensions indicated on the Drawings.
4. Coat forms in accordance with manufacturer's recommendations, prior to placing reinforcing to provide for removal of forms without damaging surface of finished concrete.
5. Design of forms, shoring and bracing is the responsibility of the Contractor.

B. Formwork Removal (ACI 301, Paragraph 4.5)

1. Wall forms, pier forms, and similar vertical forms may be removed at such time that the concrete is sufficiently strong to not be injured by removal.
2. Forms shall be removed in such a manner as to insure the complete safety of the structure.

3.03 PLACING REINFORCING

A. Reinforcing shall be held securely in place with suitable supports and ties sufficient to prevent displacement by placing of concrete. Reinforcing shall be positioned to a tolerance of plus or minus 1/4".

B. Clearance: (unless otherwise indicated)

1. Footings and slabs on earth3"
2. All other surfaces1 1/2"

C. Bars may be moved to avoid interference with other reinforcing steel, conduits or embedded items. If moved more than one bar diameter, consult with Owner to determine final placement.

D. Splicing

1. Where splices occur, provide lap sufficient to develop full strength of bars. Stagger splices. Comply with splicing requirements of ACI 318.

E. Provide anchor bolts, as shown on Drawings.

3.04 CONCRETE

A. General

1. Thoroughly clean the areas in which concrete will be placed to ensure proper placement and bonding of concrete.

B. Proportions and Consistency

1. Use proportions of ingredients to produce proper placeability, durability, strength and other required properties.

2. Proportions shall produce a mixture that will readily Work into corners, angles of forms, and around reinforcement by methods of placement and consolidation employed on the Work, but without permitting materials to segregate or excessive free water to accumulate on the surface.
3. Measure and mix materials in accordance with ACI 318, ACI 304, and ASTM C 94.

C. Placement

1. Convey concrete from mixer to final position as rapidly as possible by methods that prevent loss or segregation of ingredients.
2. Consolidate all concrete by vibration so that the concrete is thoroughly worked around the reinforcement, around embedded items, and into corners of forms, eliminating all air or stone pockets which may cause honeycombing, pitting, or planes of weakness.

D. Conditions

1. Provide protection against environmental conditions that may adversely affect the quality of the concrete before, during, and after placement of the concrete and during the curing process.

E. Finishing

1. Exterior formed surfaces: "Smooth Form Finish"
 - a. Patch all tie rod holes and honeycombs immediately upon removal of forms.
2. Provide "Broom or Belt Finish" in transverse direction on all exterior slabs.
3. Finish sharp edges, expansion joints, etc., with a steel edging tool of 1/4" radius.

END OF SECTION

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SECTION 15122

PIPE SPECIALTIES

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Compressor system, inlet and outlet piping, and related equipment, and building with foundation
- B. Existing manholes modifications
- C. Gas/leachate wellhead assemblies
- D. Driplegs
- E. Vent pipe starch

1.02 RELATED SECTIONS

- A. Section 02220 - Excavating, Backfilling, and Compacting
- B. Section 02684 - Horizontal Pipe Construction
- C. Section 02733 - Lift Station
- D. Section 03300 - Cast-In-Place Concrete
- E. Section 15162 - Leachate Well Pumps and Controls

1.03 UNIT PRICE - MEASUREMENT AND PAYMENT

- A. Basis of Measurement:
 - 1. Compressor system, including building and foundation, control system, inlet and outlet piping, and related equipment by lump sum
 - 2. Existing manholes (two) modifications by lump sum

3. Wellheads (nine) by each
4. Driplegs (two) by each
5. Vent pipe (one) by lump sum

B. Basis of Payment:

1. Compressor system and control station includes supplying and installing building and foundation, pipe, fittings, valves, dryers, filters, compressor, and related equipment and electrical controls.
 - a. Building system shall house compressor system, controls, and related equipment.
 - b. Electrical service connections shall be included.
2. Existing manholes modifications include excavating, supplying pipe and fittings, connecting drainage from two existing liquids cutoff trench manholes to the leachate collection system gravity leachate flow, and backfilling.
3. Gas/leachate wellheads include removing and reusing vault structures that are currently in place, supplying and installing pipe, fittings, and valves (wellheads) to connect all extraction well pump discharges to the leachate gravity and pressure conveyance pipe including compressed air line connections.
4. Driplegs: Includes excavating, placing pipe bedding, yellow ribbon, installing 2 driplegs, compacting of backfill, and repair of the landfill cover.
5. Vent Pipe: Includes excavating, foundation preparation, pipe fabrication, and surface restoration as shown on the Drawings.
6. Place and compact clay by cubic yard of compacted clay to a minimum depth of 2 ft below and around dripleg DL02 (if clay liner is compromised) and to the top of the existing clay liner as shown on Drawings for Dripleg DL02. A survey by a licensed surveyor, and the Engineer and Contractor shall determine the volume of compacted clay.

Backfill for dripleg DL01 shall be:

1-in. coarse aggregate meeting the following criteria:

<u>U.S. Sieve Size</u>	<u>Percent Passing</u>
1 in.	100%
3/4 in.	90-100%
3/8 in.	20-55%
No. 4	0-10%
No. 8	0-5%

1.04 DEFINITIONS AND REFERENCES

- A. ASTM D1785 - Specifications for Rigid Poly Vinyl Chloride (PVC) Plastic Pipe. Schedules 40, 80, and 120.
- B. ASTM D2464 - Threaded Poly Vinyl Chloride (PVC) Plastic Pipe Fittings. Schedule 80.
- C. ASTM D2467 - Socket-type Poly Vinyl Chloride (PVC) Plastic Pipe Fittings. Schedule 80.
- D. ASTM D3350, PE 34543C - Polyethylene Plastic Pipe and Fittings Materials. HDPE Pipe and Fittings.
- E. ASTM D1248 PE 3408 - Polyethylene Plastic Moldings and Extrusion Materials. HDPE Pipe and Fittings.
- F. ASTM D3261 - Butt Heat Fusion Polyethylene (PE) Plastic Fittings for Polyethylene (PE) Plastic Pipe and Tubing.
- G. ASTM A53 - Standard Specifications for Steel, Black, and Hot-Dipped, Zinc-Coated Welded and Seamless Pipe.
- H. ASNI/AWWA - A21.50/C150 - Thickness Design of Ductile-Iron Pipe.
- I. ANSI/AWWA - A21.51/C151 - Ductile-Iron Pipe, Centrifugally Cast in Metal Molds or Sand-Lines Molds for Water or Other Liquids.
- J. ANSI/AWWA - A21.10/C110 - Ductile-Iron and Gray-Iron Fittings 3-in. through 48-in. for Water and Other Liquids.

1.05 SUBMITTALS

- A. Manufacturer's product literature, including but not limited to, dimensions, sizes, seals, and connections, pressure rating and installation instructions. Submittals shall be for, but not limited to, pipe supports, valves, labcock

valves, temperature gauges, wellheads, sumps, and flame arresters.

- B. Submit documentation from a licensed master electrician which documents that the installed compressor, switches, controls, and seals all conform to state and national electrical codes.
- C. Operating and Maintenance instructions including, but not limited to: valves, temperature and pressure gauges, filters, dryers, sumps, wellheads, and flame arresters.

1.06 QUALITY ASSURANCE

- A. All pipe, fittings, valves and related equipment shall be new and unused.
- B. Each length of pipe shall be clearly marked with Manufacturer's name, the type and class of pipe.
- C. A guarantee of one year after acceptance by Owner of all equipment, materials, and workmanship to be free from defect and that the system will operate without excessive noise, vibration, or uncontrolled expansion.
- D. Replacement or repair shall be at no cost to Owner.

PART 2 PRODUCTS

2.01 MATERIALS

- A. Compressor system and control station equipment
 - 1. Equipment shall be a pre-engineered, factory tested package, air compressor system capable of operating the designed leachate collection system with 50% extra capacity. The system supplier shall be QED, or equal approved by the Engineer with the following features:
 - a. Size compressor to handle 14 wells total (including lift station pump).
 - b. Dryers and filters to maintain dry pump supply air to reduce freezing problems.
 - c. Controls based on logic described below.
 - d. Piping shall enter compressor building through the slab foundation with pipe sleeves as appropriate.

- e. Building vents shall be installed towards the top of building, where possible, to reduce risk of vandalism, or animal damage.
- 2. Condensate from the compressor dewatering system shall be drained by gravity to the holding tank and connected to the vent pipe riser. Conveyance pipe size and material shall be as specified by the compressor system supplier and approved by the Engineer.
- 3. The LCS control and compressor building shall be supplied as pre-assembled and tested by the manufacturer/supplier and the building shall be a Trachte steel channel frame design with the following features, or approved alternates:
 - a. A suitable concrete foundation system
 - b. Standard "Trachte Remediation Building" features
 - c. A skid-system base for building to allow portability
 - d. Heat, lights, double-door, insulation
 - e. 2-Hr fire rated
 - f. Hooded air intakes
 - g. Insulated steel floor
 - h. Building size is 10 ft x 16 ft x 8 ft-4 in. high
 - i. Standard exterior steel siding; color to be Tudor Brown.
- 4. The electrical and control system for the complete leachate collection system will be included within the Trachte building based on the following logic and controls:
 - a. The buried leachate holding tank has two floats (first high-level and second high-level). The first high-level will trip at 7,500 (75%) of the tank's capacity and will not shut down leachate extraction system pumps or lift station pumping. The second high-level will trip at 9,000 (90%) of the tank's capacity and will shut down extraction well and lift station pumps. A white light shall be illuminated on the exterior of the compressor station building signifying any high-level tank condition; light shall be visible from a vehicle.
 - b. An 8-channel (discrete inputs) telephone telemetry system shall be included to notify operating personnel of the following conditions:
 - 1) Power failure
 - 2) Buried leachate tank first high-level alarm
 - 3) Buried leachate tank second high-level alarm
 - 4) Tank interstitial wall moisture
 - 5) Compressor shutdowns

The telemetry system will use one standard phone service line. A second line shall be supplied with a cordless telephone/answering machine combination installed.

- c. Power available for the compressor and control station is: 3 phase, 4 wire, 120/208 volts service. Controls shall be 110 volt or, as appropriate.

- B. Modification shall be as shown on the Drawings. The isolation valve shall be constructed of materials described in Section 02733 (same as lift station isolation valves).

C. Gas/Leachate Wellheads

- 1. Wellheads shall be capable of:
 - a. Attaching to the 6-in. Sch. 120 PVC extraction well.
 - b. Measuring gas composition and pressure (include 1/4-in. PVC labcock valve).
 - c. Attaching to the 6-in. dia HDPE leachate gravity conveyance pipe riser
 - d. Attaching to the 6-in. dia HDPE gas header pipe riser (future)
 - e. Preventing gas from entering leachate discharge at wellhead
 - f. Handling QED pneumatic leachate pumps and controllers, in the vault structure, or approved equivalent by Engineer.
 - g. Utilizing side-flanged pipe and hose connections as shown on Drawings.
 - h. Flexible tubing shall be KANAFLEX 4in. diameter Model 10IPS with KANAFLEX clamps each end.

- D. Driplegs shall be constructed of materials shown on Drawings.

- E. The vent stack pipe shall be schedule 40 type GCS (Galvanized Carbon Steel) pipe and fittings and shall be secured with galvanized steel hardware per Drawings, or as approved by Engineer. Gusset plate shall be Schedule 80 galvanized steel, or approved equal. The vent isolation valve shall be as shown on the drawing and as described in Section 02733 (same as the lift station isolation valve).

2.02 PIPE BEDDING MATERIAL

- A. Pipe bedding material as specified in Section 02220 - Excavating, Backfilling, and Compacting, and Section 02684 - Horizontal Pipe Construction.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Engineer shall document that pipes, compressor and control station are suitable for installation of the pipe specialties.

3.02 INSTALLATION

- A. Install pipe and related equipment to the compressor and control station after the construction has been approved by the Engineer .
- B. Construct trenches according to Section 02684 - Horizontal Pipe Construction and Section 02220 - Excavating, Backfilling and Compacting.
- C. Contractor shall install wellheads in accordance with the Drawings and per manufacturer's recommendations. The wellheads shall be installed after installation of the header pipe system.

3.03 TOLERANCES

- A. Pipe inverts shall be installed to a tolerance of plus or minus 0.10 ft.

3.04 FIELD QUALITY CONTROL

- A. Engineer may collect samples of pipe bedding for laboratory testing.
- B. Engineer shall document pipe inverts at appropriate locations.

END OF SECTION

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SECTION 15162

LEACHATE WELL PUMPS AND CONTROLS

PART 1 - GENERAL

1.01 SECTION INCLUDES

- A. Supplying and installing leachate well pumps, controls, and associated electrical control equipment

1.02 RELATED SECTIONS

- A. Section 15122 - Pipe Specialties

1.03 UNIT PRICE - MEASUREMENT AND PAYMENT

- A. Basis of Measurement: Each set of well pumps, controllers, and controls by units of each.
- B. Basis of Payment: Supply and install nine sets of well pumps, controllers, controls, and associated electrical control equipment.

1.04 SUBMITTALS

- A. Manufacturer's product literature
- B. Operation and Maintenance instructions

1.05 QUALITY ASSURANCE

- A. Quality assurance shall be as approved by Engineer.

PART 2 - PRODUCTS

2.01 MATERIALS

A. Leachate Well Pumps

1. The well pump unit shall be a pneumatic submersible pump with controller and controls as manufactured by QED Model Solo II or approved equal by Engineer based on leachate quality data and extraction well design.
2. The pumps shall be 2 ft long with a leachate screen and capable of 1 to 3 gpm.
3. The controller/control system shall include a bubbler line with an environmental controller enclosure with filter, regulator, magnehelic pressure gauge, and cycle counter on air line.
4. Excess compressor/pump air shall be discharged to the atmosphere, not into the wells. The wellhead vault must be vented to the atmosphere.

B. Well Pump Controls

1. Contractor shall provide and install all power and control interconnections for proposed leachate extraction pump control system.
2. Power to the leachate extraction well pumps shall be controlled by the landfill alarm monitoring system. Extraction well pump operation shall be terminated in the event of the second high-level alarm at the buried leachate holding tank.
3. All electrical control connections shall include hazardous area conduit seal-offs.
4. The well pump cycles shall be counted at each wellhead and the lift station and the signal transmitted to the compressor/control building where monitoring personnel shall be able to view each well's and the lift station's performance.

C. Pump Volume Monitoring

1. The transmitted cycle counts from the wellheads and lift station shall be received at the compressor/control building.
2. Equipment shall be provided that will allow operating personnel with the ability to determine totalized cycle counts for all wells and lift station at any time.

PART 3 - EXECUTION

3.01 INSTALLATION

- A. Install pumps in each of the nine extraction wells, to the bottom of the well pipes per manufacturers' instructions, and as directed by the pump supplier and Engineer.

3.03 SYSTEM TESTING

- A. The performance of the submersible leachate extraction well pumps shall be demonstrated after installation in the wells.

3.04 FIELD QUALITY CONTROL

- A. Engineer shall document installation of pumps, controllers, controls, and electrical.

END OF SECTION

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SECTION 15177

UNDERGROUND LEACHATE HOLDING TANK

PART 1 GENERAL

1.01 WORK INCLUDES

- A. Underground leachate holding tank, load-out facility, and related piping and controls, including integrity inspection and testing.

1.02 RELATED SECTIONS

- A. Section 02222 - Excavating, Backfilling, and Compacting
- B. Section 02684 - Horizontal Pipe Construction
- C. Section 03300 - Cast-In-Place Concrete

1.03 UNIT PRICE

- A. Basis of Measurement: Underground leachate holding tank by lump sum.
- B. Basis of Payment: Supply and install tank, floats, pipe connections, loadout station with pipes, controls, and other related appurtenances including, hold-down equipment, excavation and backfill, and integrity testing.

1.04 SUBMITTALS

- A. Manufacturers' written product literature, including but not limited to, dimensions, sizes, seals and connections, and installation instructions. Submittals shall be for, but not limited to, underground holding tank, tank level floats, and interstitial monitoring systems.

1.05 QUALITY ASSURANCE

- A. All pipe fittings shall be new and unused.

- B. Each length of pipe shall be clearly marked with the manufacturers' names, types and classes of pipes.

PART 2 PRODUCTS

2.01 MATERIALS

A. Underground Holding Tank

1. Underground holding tank shall be a 10,000 gal underground double-walled steel tank (STI P3) by Lannon, APS, or approved equal by Engineer and shall include the following features:
 - a. Cathodic protection system
 - b. Monitoring riser for interstitial monitoring with moisture probe
 - c. Two high-level tank floats and access riser
 - d. Gravity leachate pipe inlet
 - e. Leachate loadout pipe
 - f. Entrance for condensate discharge from compressor system
 - g. Entrance for tank volume stick/sampling riser
 - h. All pipe entrances shall be flanged connections with viton gaskets
2. Tank shall have been pressure tested by manufacturer, per STI-P32 and manufacturer's guidelines, prior to delivery to the site.
3. Tank may include an STI-86 accessway to facilitate pipe connections if approved by Engineer.
4. The interstitial tank sensor shall be a conductivity type liquids discrimination sensor such as the Red Jacket Sensor No. 400-067-5, or as approved by the Engineer. Sensor riser shall be 2-in. Sch. 80 PVC pipe with access to float provided at surface using all air-tight connections for surface pipe and electrical fittings. Sensor must be accompanied by suitable control equipment and interfaced with control logic of leachate collection system as defined in Section 15122 - Pipe Specialties (2.01A).
5. The electrical and control system for the complete leachate collection

system shall be included with the Trachte building based on the logic and controls in Section 15122.

- a. Power available for the compressor and control station is:
3 phase, 4 wire 120/208 volts service.

PART 3 EXECUTION

3.01 CONSTRUCTION TOLERANCES

A. Horizontal

1. The condensate collection system shall be installed to a tolerance of ± 1.0 ft from that shown on the Drawings.

B. Vertical

1. The condensate collection system shall be installed to a tolerance of ± 0.5 ft from that shown on the Drawings.

3.02 CONSTRUCTION

- A. Install holding tank and appurtenances at locations and elevations shown on Drawings.

- B. Excavation for holding tank shall occur according to Section 02220 - Excavating, Backfilling and Compacting. Backfill shall be:

1-in. coarse aggregate meeting the following criteria:

<u>U.S. Sieve Size</u>	<u>Percent Passing</u>
1 in.	100%
3/4 in.	90-100%
3/8 in.	20-55%
No. 4	0-10%
No. 8	0-5%

- C. Tank level indicators and interstitial monitoring service shall be installed according to the manufacturer's written instructions and shall operate to achieve the system control and logic described per Section 15122 - Pipe Specialties.

- D. Tank installation shall include concrete deadweights as shown on the Drawings and in accordance with Section 03300 - Cast-In-Place concrete.

Hold down straps shall be capable of holding against calculated buoyant forces of 84,000 lb. Straps and hardware shall be steel, with corrosion coating, and shall be isolated from the tank, or approved equal by Engineer.

- E. Loadout basin shall be as shown on Drawings.
- F. The holding tank shall be pressure tested after installation and prior to backfill to verify integrity of tank and pipe connections. Test must include condensate conveyance pipe from dripleg DL02 which carries the condensate to the tank.

The tank and the interstice shall be tested separately and shown to hold 5 psi for a minimum of 1 hour without losses.

END OF SECTION

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SECTION 16000

ELECTRICAL REQUIREMENTS

PART 1 - GENERAL

1.01 GENERAL

- A. Provide all equipment, materials, labor and services to furnish, install and connect the various components of the Work, as required by these Specifications and as shown on the Drawings, including all incidental items necessary to complete the project in every respect.
- B. Provide electrical equipment and materials which conform to the applicable standards of the National Electrical Manufacturers Association (NEMA), the American National Standards Institute (ANSI), and are listed or labeled by Underwriters Laboratories (UL) or other approved agency.
- C. Provide equipment and materials from the manufacturers specified. Substitute products from other manufacturers only with prior approval from the Engineer.
- D. Install equipment and materials in compliance with the latest editions of the National Electrical Code (NEC) and the National Fire Protection Association's, Life Safety Code (NFPA-101).
- E. Submit for approval at least four (4) copies of shop drawings for equipment, including, but not limited to, the following:

- | | |
|---------------------------------|-------------------------------|
| - TRANSFORMERS | - DIMMER FIXTURES |
| - DISTRIBUTION PANELS | - TIMER SWITCHES |
| - LIGHTING PANELS | - CAPACITORS |
| - RECEPTACLE PANELS | - CABLE TRAYS |
| - MOTOR CONTROL CENTERS | - MEDIUM VOLTAGE CABLES |
| - MOTOR STARTERS | - TERMINATION AND SPLICE KITS |
| - CONTACTORS | - FIRE ALARM SYSTEMS |
| - DISCONNECT SWITCHES | - CLOCK SYSTEMS |
| - VARIABLE SPEED DRIVES | - SECURITY SYSTEMS |
| - LARGE MOTORS (ABOVE 40 HP) | - INTERCOM SYSTEMS |
| - FEEDER BUS DUCT | - PUBLIC ADDRESS SYSTEMS |
| - PLUG-IN BUS DUCT | - CCTV SYSTEMS |
| - WIRING DEVICES | - SOUND SYSTEMS |
| - FLEXIBLE MANUFACTURED WIRING | - MISC. CONTROL SYSTEMS |
| - ELECTRICAL NONMETALLIC TUBING | - MISC. CONTROL PANELS |
| - LIGHTING FIXTURES | - THERMOSTATS |

- F. Provide, maintain and remove all temporary lighting and power required for the completion of the Work.
- G. Carefully remove and clean items designated for relocation, and store for reuse. Legally dispose of all removed items which are not being re-used.
- H. Coordinate all power interruptions with Engineer or Owner to minimize inconvenience to the Owner activities. Maintain power to all loads outside of the Work area.
- I. Install and connect new Work to existing Work neatly and carefully. Existing Work that is disturbed shall be replaced or repaired as necessary to restore it to its prior condition.
- J. Coordinate Work with the other trades to assure working space around electrical equipment is in accordance with the NEC.
- K. Coordinate Work with the other trades to provide access to equipment requiring maintenance. Provide access doors to all maintainable equipment located behind walls or above permanent ceilings.
- L. Should field conditions prevent the installation of equipment or materials as indicated on the Drawings, deviations shall only be made with the prior approval of the Engineer.
- M. Submit, to Engineer, marked up, "as built" or record Drawings showing actual locations of all equipment, light fixtures, switches, receptacles and junction boxes, the sizes and conductor information for conduits, circuit numbers, risers and all deviations from the design. Dimension the locations of buried, embedded, and concealed primary and feeder circuit conduits from a permanent building feature such as a column, beam, etc.

PART 2 - PRODUCTS

2.01 GENERAL

- A. Lighting and receptacle panels shall be based on 200 amp service, 3 phase, 4 wire, 120/208 volts with at least 22,000 (verify with local utility) amps AIC-rated, circuit breaker type, with main circuit breaker 30 minimum positions (based on need), copper bus, fully rated neutral and ground bar, NEMA 1 enclosure and surface trim. Provide circuit breakers as shown. Allen-Bradley, Eaton/Cutler Hammer, GE, Siemens, Square D, or Westinghouse.

- B. Combination starters shall be 250 volts, 3 pole, NEMA size (based on motor sizes), fusible disconnect switch type, with "hand-off-auto" selector switch, red "run" pilot light, 120 volt fused control transformer, 2 N.O. and 2 N.C. auxiliary contacts, and a NEMA type 1 enclosure. Provide Class R dual element fuses and overload heaters sized in accordance with the motor nameplate. Allen-Bradley, Eaton/Cutler Hammer, GE, Siemens, Square D or Westinghouse.
- C. Disconnect switches shall be 250 volts, amps (based on motor sizes), 3 pole, heavy duty, fusible type in a NEMA-1 (indoor) enclosure. Provide Class R dual element fuses as shown. Allen-Bradley, Eaton/Cutler Hammer, GE, Siemens, Square D or Westinghouse.
- D. Toggle switches shall be 120/277 volts, 20 amps, single pole, double pole, 3-way or 4-way as shown, specification grade, extra-heavy duty, with ivory [brown, white] handles. Arrow Hart, Bryant, Hubbell, Pass & Seymour.
- E. Dimmer switches shall be rated 600 [1000] watts minimum, specification grade, heavy duty, with radio noise filter and suitable for use in a single gang box. Leviton, Lithania or Lutron.
- F. Duplex receptacles shall be 125 volt, 20 amp, 2 pole, 3 wire, specification grade, extra-heavy duty grounding type with nylon or lexan bodies and ivory faces. Bryant, Hubbell or Pass & Seymour No. 5362.
- G. GFI duplex receptacles shall be rated 125 volts, 20 amps, 2 pole, 3 wire straight blade type. GFI receptacles shall trip when ground currents exceed 5 MA, shall trip in 25 milliseconds, and shall have an interrupting rating of 2,000 amps. Bryant, Hubbell or Pass & Seymour.
- H. Cover plates for switches and receptacles shall be high quality stainless steel.
- I. Provide lighting fixtures and lamps as shown on Drawings.
- J. Conduits indoors through 4 in. diameter shall be EMT with steel set screw fittings. Conduits outdoors, conduits indoors over 4 in., conduits for primary distribution, and conduits for fire pump feeders shall be rigid steel or intermediate metal conduit with cast or malleable iron threaded fittings. Fire pump feeder conduits shall be encased in 2 in. of concrete (or an equivalent 1 hour fire resistance) in accordance with NFPA-20.
- K. Drops to recessed lighting fixtures may be flexible metallic conduit or flexible manufactured wiring. Electrical nonmetallic tubing may also be used, but only where accessible and where permitted by code.

- L. Connections to motors, vibrating equipment, or equipment removed for routine maintenance shall be made with liquid tight flexible metallic conduit and liquid tight fittings.
- M. Surface raceways shall be UL approved, PVC-coated rigid pipe and sized for the number of conductors contained within. PVC pipe can be used for control wires in trenches. Barriers shall be provided when necessary to separate conductors of different voltages or services. Airey-Thompson, Isoduct, Walker or Wiremold.
- N. Wire and cable shall be single conductor copper, with type THHN insulation rated 90°C, 600 volts. Minimum wire shall be No. 12 AWG (American Wire Gauge), except for control and alarm system wiring, which may be smaller. Wire, No. 12 AWG and larger, shall be stranded. Anixter, Brand-Rex, Carol, Rome, Southwire or Triangle.
- O. Connectors for splicing power cables shall be of the solderless compression type. Connectors for splicing branch circuit wiring, lighting wiring, and control and instrumentation wiring shall be of the solderless wire nut type. Lugs for terminating power cables shall be of the solderless compression ring type. Lugs for terminating control and instrumentation wiring shall be of the solderless compression ring or spade type. Compression terminations shall be crimped with tools designed for the terminations being crimped.
- P. Nameplates shall be engraved lamicoid with dark letters on a light background, and letters at least 1/4 in. high. Self-adhesive plastic type labels are not acceptable.

PART 3 - EXECUTION

3.01 INSTALLATION

- A. Install equipment in accordance with manufacturers' instructions.
- B. Support all electrical items independently of supports provided by the other trades.
- C. Support recessed lighting fixtures independently of the ceiling grid system using two safety wires minimum on diagonally opposite corners of the fixtures.
- D. Support raceways and boxes using 1/4 in. minimum diameter threaded rod hangers. Suspended ceiling hangers or hanger wire shall not be used.

E. Route and independently support flexible metallic conduit, electrical nonmetallic tubing, and flexible manufactured wiring in a neat and workmanlike manner, and secure at intervals not exceeding 3 ft.

F. Provide a nameplate indicating the equipment name or number where shown on Drawings, and its power source, for the following equipment:

- | | |
|---------------------------------|-------------------------------|
| - Transformers | - Dimmer Fixtures |
| - Distribution Panels | - Timer Switches |
| - Lighting Panels | - Capacitors |
| - Receptacle Panels | - Cable Trays |
| - Motor Control Centers | - Medium Voltage Cables |
| - Motor Starters | - Termination and Splice Kits |
| - Contactors | - Fire Alarm Systems |
| - Disconnect Switches | - Clock Systems |
| - Variable Speed Drives | - Security Systems |
| - Large Motors (above 40 hp) | - Intercom Systems |
| - Feeder Bus Duct | - Public Address Systems |
| - Plug-in Bus Duct | - CCTV Systems |
| - Wiring Devices | - Sound Systems |
| - Flexible Manufactured Wiring | - Misc. Control Systems |
| - Electrical Nonmetallic Tubing | - Misc. Control Panels |
| - Lighting Fixtures | - Thermostats |

G. Provide a typed directory for all new and modified panelboards.

H. Mark junction box covers with the panel and breaker numbers of the circuits contained within.

I. Size conduits in accordance with the NEC, but not less than the sizes shown on the Drawings. Minimum conduit size shall be 3/4 in. diameter (except for individual switch drops and lighting fixture drops, which may be 1/2 in. diameter).

J. Install conduits parallel or at right angles to building lines.

K. Make changes in primary distribution conduit direction aboveground with sweeps and long radius elbows, and underground with 10 in. minimum radius bends.

L. Conceal conduits wherever possible and practical. When conduits cannot be concealed in finished areas, use surface raceways with matching boxes of the same manufacture as the raceways.

M. Provide sleeves for all conduits penetrating floors. Sleeves shall extend above the floor a minimum of 2 in., and shall either be embedded in the concrete or sealed to the concrete with epoxy grout.

- N. Seal floor sleeves and penetrations in fire-rated walls as required to maintain the fire ratings.
- O. Provide an individual feed from a junction box to each lighting fixture. Lighting fixtures shall not be daisy-chained.
- P. Provide a separate neutral conductor back to the panel neutral bar for each single phase branch circuit. Neutrals of single phase circuits shall not be shared or daisy-chained.
- Q. Provide a separate green grounding conductor for each branch circuit to devices, fixtures and outlet boxes from the panel ground. Grounds shall not be shared or daisy-chained. Raceways shall not be used as grounding conductors.
- R. Phase new installations X-Y-Z (or A-B-C) from top to bottom, front to back, and left to right when viewed from the front. Phase existing installations to match the existing.
- S. If no color coding system exists, color code circuits as follows:

<u>Phase</u>	<u>X(A)</u>	<u>Y(B)</u>	<u>Z(C)</u>	<u>Neutral</u>	<u>Ground</u>
Above 600 Volts	Black	Red	Blue	-	-
480/277 Volts	Brown	Orange	Yellow	Grey*	Green
208/120 Volts	Black	Red	Blue	White*	Green
240/120 Volts	Black	Red	-	White*	Green
Less than 120 Volts - use industry standard methods					

Note: When neutrals from two different systems or voltage levels are routed through the same raceway or box, the neutrals from one set shall be color coded with a colored stripe.

- T. Color code disconnect switches, junction box covers, etc., of emergency circuits with red paint for easy identification.
- U. In general, install equipment and devices at the following heights:

<u>Device</u>	<u>Mounting Height</u> <u>(Except as Otherwise Noted)</u>
Receptacles (wall)	18" A.F.F.** to center
Receptacles (above counter)	48" A.F.F. to center
Receptacles (unfinished area)	48" A.F.F. to center
Receptacle strips	42" A.F.F. to bottom
Light switches	48" A.F.F. to center
Telephone outlets (wall phone)	54" A.F.F. to center
Telephone outlets (desk phone)	18" A.F.F. to center
Clock outlets	88" A.F.F. to center
Fire alarm pull stations	48" A.F.F. to center
Fire alarm horn/strobes	88" A.F.F. to center
Electrical panels	72" A.F.F. to top
Safety switches/motor starters	72" A.F.F. to top**
Motor control pushbuttons	60" A.F.F. to center

Note: *A.F.F. (Above Finished Floor)

**Highest point on handles shall not exceed 78" A.F.F.

- V. Provide ground fault circuit interrupter protection for all 120 volt duplex receptacle outlets located outdoors, in toilet areas, and within 6 ft of sinks, cup sinks, and lavatories.

END OF SECTION

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SECTION 16900

INSTRUMENTATION AND CONTROL SYSTEMS

PART 1 - GENERAL

1.01 DESCRIPTION OF SYSTEMS

- A. Lift Station pump and controls as stated in Section 02733.
- B. Compressor system as stated in Section 15122.
- C. Leachate well pumps, controllers, and controls as stated in Section 15160.
- D. Underground leachate tank as stated in Section 15177.
- E. Furnish all labor, materials, equipment, technical supervision, and incidental services required to complete, test, and leave ready for operation the electrical and control system as indicated on the Drawings and Specifications.

1.02 STANDARD OF QUALITY CONTROL

- A. Throughout the Specifications, types of materials may be specified by manufacturer's name and catalog number in order to establish standards of quality and performance and not for the purpose of limiting competition. Unless specifically stated otherwise, the Contractor may assume the phrase "or other approved" is inferred, except that the burden is upon the Contractor to prove equality with specified items. If the Contractor elects to prove such equality, he must request the Engineer's and the Owner's approval, in writing, prior to substituting for the specified item. The Contractor shall state the cost difference involved, with supporting data, and samples if required, to permit a fair evaluation of the proposed substitute with respect to quality, serviceability, warranty, and cost.

1.03 SOURCE QUALITY CONTROL

- A. Furnish equipment and materials indicated on the Drawings and in the Specifications conforming to Equipment Publications and Underwriters' Laboratories, Inc., and National Electrical code.
- B. All equipment and materials indicated on the Drawings and in the Specifications shall bear the UL label.
- C. Furnish wire and cable on which standard factory tests established by ASTM, ANSI, and NEMA have been performed.

1.04 FIELD QUALITY CONTROL

- A. Install equipment and material in compliance with the regulations of local, state, or federal governmental laws governing electrical installation, the latest edition of the National Electrical Code, and the requirements of the Drawings and Specifications.

1.05 SUBMITTALS

- A. Submit four (4) sets of shop Drawings for items listed herein. Include complete data on each item. Coordinate the items, as they relate to the Work, prior to submittal. Shop Drawings shall include:
 - 1. Fuses
 - 2. Control Transformers
 - 3. Control Relays
 - 4. Timers
 - 5. Disconnect Switches
 - 6. Pushbutton Switches
 - 7. Pilot Lights
 - 8. Selector Switches
 - 9. Conduit
 - 10. Wiring

1.06 PRODUCT DELIVERY, STORAGE, AND HANDLING

- A. Wire and Cable Delivery
 - 1. Deliver all wire and cable to the site on reels or in coils, plainly marked for complete identification, including the wire or cable size, the number of conductors, type of wire or cable, length, weight, thickness and character of the insulation, and the name of the manufacturer. Furnish [300] volt wires for instrumentation cables on

coils and reels carrying original date-perforated inspection labels of the Underwriters' Laboratories showing the number of feet and type of wire contained.
DO NOT MIX WITH POWER WIRES.

PART 2 - PRODUCTS

2.01 MATERIALS

A. Conduit, Conduit Fittings, Outlet Boxes, and Pull and Junction Boxes

1. Provide as specified

2.02 WIRE AND CABLE

A. Provide as specified

- B. Multiconductor instrumentation cables: Copper, not less than No. 18 AWG. Furnish conductor sizes as indicated. For two conductor, provide 2-conductor twisted with 100% shield and drain wire. If multiconductor cables are proposed, provide twisted pairs with shield and drain wire with minimum 10% spares. Manufacturer:

1. Beldon Cable Co.
2. Alpha Cable Co.
3. Other approved.

2.03 CONTROL DEVICES

- A. Push Buttons and Selector Switches: Heavy duty, oil-tight type, with contacts, 10 amperes continuous, [300] volts AC, with legend plate and operation as indicated. Manufacturer:

1. Allen-Bradley Bulletin 800T
2. General Electric CR2940

- B. Indicating Lights: Heavy duty, oil-tight type with 6 volt lamp, integral 120-6 volt transformer, push-to-test feature, color cap and legend plate as indicated. Manufacturer:

1. Allen-Bradley Bulletin 800T
2. General Electric CR2940
3. Square D Class 9001, Type K

C. Control Relays: Heavy duty industrial type with convertible contacts rated 10 amperes continuous, 300 volts AC. Provide coils for operation on 120 volts AC unless other requirements are indicated. Provide number and type of contacts as indicated. Where interposing relays are provided as part of the direct digital controller, manufacturer's standard relay model is acceptable. Manufacturer:

1. Allen-Bradley Bulletin 700, Type P
2. Square D Class 8501, Type G

D. Control Relays: Miniature, plug-in, rated 3A, 120V AC, provide coils for operation on 120V AC unless other requirements are indicated. Provide number and type of contacts as indicated. Manufacturer:

1. Westinghouse Type MC
2. Square D Class 8501, Type R
3. Potter Brumfield KHAV Series

E. Enclosures: NEMA, 1, 12, 4, and 4X outdoor and wet location enclosures shall be NEMA 4. In corrosive areas use NEMA 4X.

F. Limit Switches: Oil-tight type with operator to provide required function. Manufacturer:

1. Allen-Bradley
2. General Electric
3. Square D
4. Westinghouse

G. Control Transformers: 120/240V AC as required, size as indicated, complete with fuses. Mount in NEMA 1 enclosure. Manufacturer:

1. Allen-Bradley
2. Square D
3. Other approved

H. Terminal Blocks: 300 volt class terminals with wire clamps. Manufacturer:

1. Allen-Bradley Bulletin 1492
2. Buchanan
3. Other approved

2.04 GROUNDING

- A. Insulated Grounding Conductors: stranded annealed copper insulated with a heat and moisture resistant polyvinyl chloride compound and meeting UL Requirements for Type THW, 75 deg C, rated 600 volts, color-coded green. Conductor No. 10 AWG and smaller may be solid in lieu of stranded.

2.05 GROUNDING CONNECTIONS

- A. Exothermic Welding Connection Materials. Manufacturer:

- 1. Cadweld
- 2. Other approved

2.06 WIRING DEVICES

- A. Ground Fault Circuit Interrupter (GFI) Receptacle: 120 VAC, 15/10 amp., feed through, Class A. Manufacturer:

- 1. Arrow-Hart GF 5242
- 2. General Electric CTR Series
- 3. Gould/TTE GFIR Series
- 4. Pass and Seymour 1591-F Series

2.07 LIGHTING FIXTURE

- A. 150 watt weather proof fixture.

- B. Manufacturer:

- 1. Daybright
- 2. Westinghouse
- 3. Other approved

PART 3 - EXECUTION

3.01 CONDUIT MATERIAL INSTALLATION

- A. Conduit and fittings between field-mounted equipment and wall or building-mounted pull boxes shall be rigid. Home runs between local pull boxes, wall-mounted panels and/or pull boxes may be EMT conduit.

3.02 WIRE AND CABLE INSTALLATION

- A. Splicing of instrumentation cable is not allowed. Where required because of length of runs, Contractor shall use approved terminal boxes.

3.03 DISTRIBUTION EQUIPMENT SUPPORTS AND IDENTIFICATION

- A. Anchor all self-supporting equipment securely to floors and to supporting steel where such supports are required.
- B. Provide identification on all control panels:
 - 1. On surfaces 4 in. by 4 in. and greater, hand paint or stencil with bright yellow paint, or provide good quality decal, with bright yellow letters.

3.04 GROUNDING

- A. Where insulated conductors are used, thoroughly tape all exposed connections.
- B. Carry an equipment ground wire with all branch circuit conductors.
- C. Where metallic conduit is used for mechanical protection of a ground conductor, bond conductor to the conduit at each end.

3.05 ELECTRICAL ACCEPTANCE TESTS

- A. Description of Systems
 - 1. Preliminary inspections and tests: Visual inspections of electrical equipment, wire checks of factory wiring, and any other preliminary Work required to prevent delays during performance of electrical acceptance tests.
 - 2. Electrical acceptance tests: Those inspections and tests required to show that the workmanship, methods, inspections, and materials used in erection and installation of the electrical equipment conforms to accepted Engineering practices as per the IEEE Standards, IPCEA-NEMA Standards, the National Electrical Code, manufacturer's instructions, and this Section, and to determine that the equipment involved may be energized for operating tests.

3. Operating tests: Those tests performed on all electrical equipment installed under this Section, and under other Sections, to show that the electrical equipment will perform the functions for which it was designed.
4. Furnish all labor, materials, test equipment, and technical supervision to perform and record the electrical tests as specified, and perform and record all electrical tests as required, including tests on 600 volt wire and cable and control devices, unless otherwise specified.

B. Related Work Specified in Other Sections

1. Operating tests on mechanical and electrical equipment installed under other Sections of these Specifications to prove capability of such equipment to perform as specified.

3.06 FINAL ACCEPTANCE

- A. Final acceptance of electrical equipment will not only depend on equipment integrity as determined by the electrical acceptance tests, but will also depend on complete operational tests, whether performed under this or other Sections.

3.07 TEST REPORT SUBMITTALS

- A. Submit test reports, including complete data on actual readings taken and corrected values, to the Engineer for approval after each test period. Prior to submission, have all test reports signed by authorized witnesses. Do not energize any equipment or material for full-time operation tests until test data has been approved.
- B. Submit two copies of final approved test reports to the Owner, through Engineer, at the completion of the Work under this Section.

3.08 ENVIRONMENTAL REQUIREMENTS

A. Humidity

1. Do not perform megger tests during times of high relative humidity.

3.09 SCHEDULING OF TESTS

- A. Perform all acceptance and operating tests in the presence of the Engineer.

- B. Schedule sequence of tests so that equipment can be energized immediately after completion of the applicable tests and approval of test reports. Notify the Engineer of time of test at least 48 hours prior to testing.
- C. Notify vendors and manufacturers of electrical equipment of the time of tests and extend reasonable cooperation to them or their representatives to permit them to witness tests should they so request. Obtain list of manufacturers of Owner-prepurchased equipment from the Engineer.

3.10 GENERAL TESTING REQUIREMENTS

A. Preliminary Work

- 1. Perform preliminary inspections and tests immediately prior to performing acceptance tests. Fuses and fusing devices, such as cable limiters, shall be omitted from cable tests and tests involving cables.

B. Megger Tests

- 1. Megger readings specified are the minimum readings desired at an ambient temperature of 60 deg F (15.56 deg C) and at a low relative humidity. When megger readings are taken at other than 60 deg F, convert readings to equivalent values at 60 deg F.
- 2. When megger readings fall below the specified minimum values at 60 deg F, devise some means of applying heat for the purpose of drying out the equipment, subject to the approval of the Engineer. If drying is to be done by applying an electrical potential to a piece of equipment, do not exceed the continuous voltage or current ratings for the equipment which is to be dried, either directly or by induction.

C. Continuity Tests

- 1. Perform continuity tests with a DC type device using a bell or buzzer. Do not use phones for continuity tests, use phones only for communication.

3.11 TESTS ON CONTROL WIRING

A. General

- 1. Give each single conductor and multiconductor control wire or cable a continuity test and an insulation strength test. Verify identification of conductors.

B. Connections

1. Disconnect and fan out conductors to be tested.

C. Insulation Strength Tests

1. Subject each control wire to a [1000 volt, 60 hertz test].
2. Apply test between each conductor in a wire group and ground with all other conductors in the wire group grounded to the same ground. Use a test set having an accurate means of insuring 1000 volt test voltage and provide a series resistance to limit fault when a ground is found. Hold test voltage only long enough to read instruments. Test each conductor in the same manner.
3. In lieu of the above insulation strength test, megger each control wire as specified for [480] volt power conductors.

D. Acceptance

1. Wires must pass all tests.

E. Records

1. Include the following information in test report on each wire group.
 - a. Wire and group identification
 - b. Type of test, insulation strength or megger
 - c. When megger testing is selected, include information as specified for [480] volt power cables.

3.12 TESTS ON CONTROL DEVICES

A. General

1. Perform operating tests on all control or indicating devices installed under this Section.

B. Connections

1. Include motors and protective control devices in test circuitry where operation of motors will not damage attached equipment.
2. Where equipment could be damaged by energizing motors, disconnect motor leads at the load side of starters.

3. Jumper or disconnect, as applicable, control devices installed under other Contracts to permit testing those devices and circuitry installed under this Section.
4. Coordinate these connections and tests with the Contractor responsible for the installation of motors.

C. Acceptance

1. Control devices and circuitry must pass all tests to prove that all operating functions are satisfactorily performed, including manual and automatic operation and interlocking.

D. Records

1. Make complete records of all tests and submit two (2) copies to Engineer.

END OF SECTION

DRF/vlr/TAB
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C



C

CAPITAL COST ESTIMATE

BLACKWELL FOREST PRESERVE LANDFILL
LEACHATE COLLECTION SYSTEM

CONSTRUCTION COST ESTIMATE

<u>Description</u>	<u>Quantity</u>	<u>Unit</u>	<u>Unit Price</u>	<u>Total</u>
Engineering & Construction Management/QA	1	LS	\$ 15,000.00	\$ 15,000
Quality Control	1	LS	\$ 7,000.00	\$ 7,000
Mobilization/Demobilization	1	LS	\$ 20,000.00	\$ 20,000
Surveying	1	LS	\$ 7,000.00	\$ 7,000
Erosion Control	1	LS	\$ 3,000.00	\$ 3,000
Extraction Wells (installed in 1996)	1	LS	\$ 100,000.00	\$ 100,000
Clear and Grub	1000	SY	\$ 18.15	\$ 18,150
Gas Pipe Trenches	3300	LF	\$ 48.00	\$ 158,400
Leachate Gravity Pipe	1900	LF	\$ 8.50	\$ 16,150
Leachate Pressure Pipe	1500	LF	\$ 6.20	\$ 9,300
Individual Control Wires	16000	LF	\$ 1.00	\$ 16,000
Header / Riser Cleanouts	19	Each	\$ 533.00	\$ 10,127
Existing Manhole Modifications	1	LS	\$ 3,657.00	\$ 3,657
Gas / Leachate Well Heads	9	Each	\$ 815.00	\$ 7,335
Well Pumps w/ Transmitter	9	Each	\$ 7,220.00	\$ 64,980
Driplegs	2	Each	\$ 6,050.00	\$ 12,100
Lift Station	1	LS	\$ 15,400.00	\$ 15,400
Leachate Holding Tank	1	LS	\$ 55,000.00	\$ 55,000
Compressor and Control Station	1	LS	\$ 71,500.00	\$ 71,500
Aggregate Paving	700	SY	\$ 17.82	\$ 12,474
Chain Link Fencing	250	LF	\$ 27.50	\$ 6,875
Electric Supply	1	LS	\$ 20,000.00	\$ 20,000
Place Topsoil	1000	CY	\$ 16.50	\$ 16,500
Seed	0.5	Acre	\$ 3,000.00	\$ 1,500
Concrete Pad and Building	1	LS	\$ 66,000.00	\$ 66,000
Vent and Hookups	1	LS	\$ 35,000.00	\$ 35,000
Misc. characterizing testing, legal & permitting	1	LS	\$ 5,000.00	\$ 5,000
Total Cost				\$ 773,000
Contingency				\$ 27,000
TOTAL				\$ 800,000



D



D

DESIGN CALCULATIONS

- D1 Leachate Holding Tank Calculations**
- D2 Negative Pressures Requirements Calculation**
- D3 Dripleg Design Calculation**

D1

LEACHATE HOLDING TANK CALCULATIONS

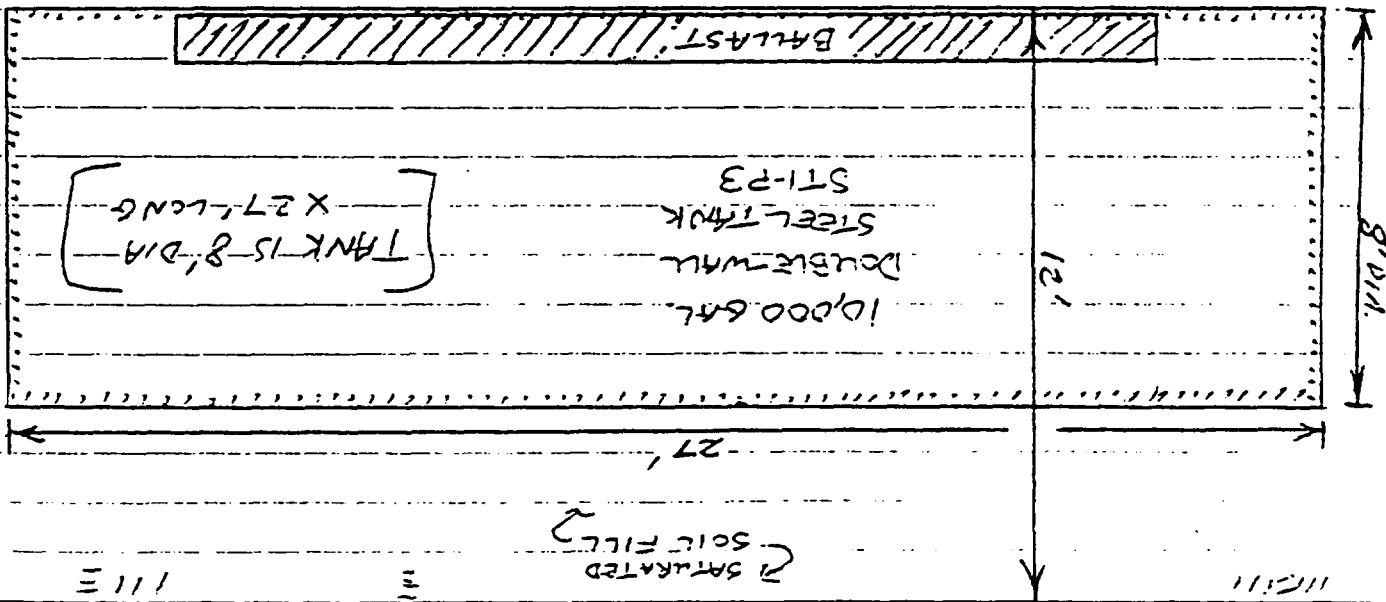


BY DLF DATE 8-27-96 SUBJECT BACKWELL FPD
CHKD. BY JMK DATE 9-30-96
SHEET NO. 1 OF 4
JOB NO. 3920 CC 50

TANK SKETCH AND CALCULATION

Sketch
Scale: 1" = 4'

GROUND SURFACE

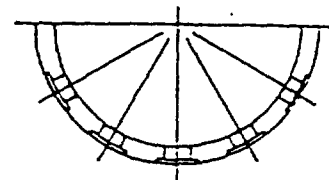
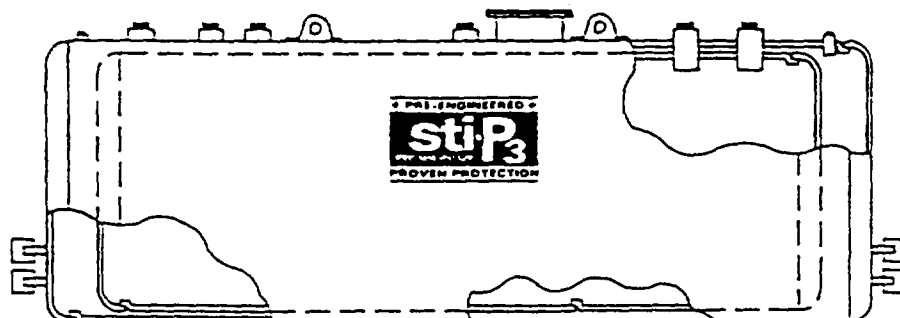


CROSS-SECTION OF
BALAST, SKETCH: 1' X 1' X 20' LONG FORM (REINFORCED)
TWO DEMOWEIGHTS - ONE EACH SIDE

12"
12"

sti-P₃® UNDERGROUND TANKS

Type II • Double Wall



END SECTION

BMT STANDARD DIMENSIONS



CAPACITY* (Gallons)	INNER TANK DIAMETER	INNER TANK LENGTH	MINIMUM THK.	OUTER TANK DIAMETER	OUTER TANK LENGTH	MINIMUM THK.	Wt. Lbs. (Approx.)
560	4'	6'	10 ga.	4'-4"	7'	10 ga.	1700
1000	64"	6'	10 ga.	5'-8"	7'	7 ga.	2600
2000	64"	12'	7 ga.	5'-8"	13'	7 ga.	4300
4000	7'	13'-10"	7 ga.	7'-4"	14'-10"	1/4"	8100
6000	8'	16'	1/4"	8'-4"	17'	1/4"	11900
8000	8'	21'	1/4"	8'-4"	22'	1/4"	14700
10000	8'	27'	1/4"	8'-4"	28'	1/4"	18100
10000	9'	21'	1/4"	9'-4"	22'	1/4"	16700
12000	8'	32'	1/4"	8'-4"	33'	5/16"	23500
12000	9'	25'	1/4"	9'-4"	26'	5/16"	21500
15000	11'	21'	5/16"	11'-5"	22'	5/16"	26400
20000	11'	28'	5/16"	11'-5"	29'	3/8"	36400
25000	11'	36'	3/8"	11'-5"	37'	3/8"	48100
30000	11'	42'	3/8"	11'-5"	43'	3/8"	55600
46500	11'-7"	59'	3/8"	12'-0"	60'	3/8"	80000

* Other tank sizes available upon request.

STANDARD SPECIFICATIONS

- Built per UL 58 Type II Double Wall and sti-P₃® tank specifications.
- Tanks will bear UL and sti-P₃® labels.
- BMT Standard 88 opening locations and two (2) lifting lugs.
Exterior is blasted and painted per sti-P₃® requirements.
Anode quantity and location may vary by size of tank.
- Weld-on zinc anodes shown.
- Striker plates provided under all openings.



ST. PAUL

2875 Highway 55
St. Paul, MN 55121
(612) 454-6750

**BLACKWELL FOREST PRESERVE LANDFILL
LEACHATE COLLECTION SYSTEM
UNDERGROUND HOLDING TANK BUOYANCY CALCULATION**

A. Objective:

Check buoyancy and determine ballast for the condensate/leachate holding tank at the Blackwell Landfill.

B. Assumptions:

- 1) 10,000 gallon empty tank
- 2) Tank weighs 18,100 lbs empty
- 3) Water table is at ground surface for worst case
- 4) Density of ~~saturated~~-dry soil is $123 - 62.4 = 60$ lb/cf
- 5) Density of concrete is 150 lb/cf
- 6) Density of water is 62.4 lb/cf

C. Tank Calculation:

- 1) Restraining forces (downward)
 - a) Soil above tank is 4 ft thick minimum for worst case
Tank dimensions are: 8 ft dia. x 27 ft long
Soil volume above tank is 864 cf ($8 \times 27 \times 4$)
Soil density is 60 lb/cf
Soil weight above tank is 51,840 lbs (864×60)
 - b) Tank weight is 18,100 lbs
 - c) Total restraining weight is $51,840 + 18,100 = \underline{69,940 \text{ lb}}$ (downward)
- 2) Buoyant forces (upward)
 - a) Empty tank
$$10,000 \text{ gal} \times \frac{(1 \text{ cu ft})}{7.48 \text{ gal}} = 1,337 \text{ cf}$$
Density of water is 62.4 lb/cf
Buoyant force is $62.4 \text{ lb/cf} \times 1,337 \text{ cf} = \underline{83,428 \text{ lb}}$ (upward)

D. Ballast Calculation

- 1) Restraining weight force downward is 69,940 lb
- 2) Buoyant force upward is 83,428 lb
- 3) Net result is $69,940 \text{ lb} - 83,428 \text{ lb} = (13,488) \text{ lb}$

Therefore, concrete ballast is needed.

E. Ballast (Deadweight) Addition:

- 1) Deadweights: (Two @ 1 ft wide x 1 ft thick x 20 ft long)
Weight = $2 (1)(1)(20) (150 \text{ lb/cf} - 62.4 \text{ lb/cf})$
= 3,504 lb
- 2) Soil above deadweights: (Two @ 1 ft x 20 ft x (8 ft + 4 ft))
Weight = $2(1)(20)(12\text{-ft depth})(60 \text{ lb/cf})$
= 28,800 lb (downward)
- 3) Total Deadweight additional force is
= 3,504 + 28,800
= 32,304 lb (downward)

F. Conclusion:

- 1) Buoyant force total is 83,428 lb (upward)
- 2) Restraining force total is $69,940 + 32,304 = 102,244 \text{ lb}$ (downward)
- 3) Net result is force of 18,816 lb (downward)
- 4) Factor of safety is $102,244/83,428 = 1.23$

DRF/vr/JMR
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1252008.0409.0059-MD

D2

NEGATIVE PRESSURES REQUIREMENTS CALCULATION

NEGATIVE PRESSURE REQUIREMENTS CALCULATION BLACKWELL LANDFILL SITE

The negative pressure requirements calculation estimates the total negative pressure (vacuum) requirements of the potential active LFG extraction system. The negative pressure requirement is the amount of vacuum that must be applied to the LFG control system wellfield to properly extract the available LFG and reduce LFG migration.

The vacuum applied to a wellfield is generated by use of a mechanical device such as a blower or compressor. In the event that the Blackwell Landfill may utilize active LFG extraction, a blower system would be located near the northwest corner of the site. The LFG main header pipe is designed as a single branch configuration with well EW08 located at the system extremity. Six of the total nine wells are considered directly connected to the main LFG header pipe. The 3 remaining wells are connected to the main header pipe using a series of lateral header pipes.

The vacuum requirement is calculated based on the headlosses estimated for each section of header pipe along the critical main header branch. Critical typically defines the branch that realizes the greatest headloss since it carries the most flow and includes the majority of the piping and fittings. For the Blackwell Landfill header pipe system, the critical path has been selected as beginning at well EW08 and following the flow path past wells EW06, EW05, EW04, EW02, and EW01A flowing toward dripleg DL02.

In a typical LFG header pipe segment, the LFG extracted from a well is directed through the wellhead, through the header riser, and through the LFG header pipe as it proceeds to the blower. At each well and lateral header connection along the way, additional LFG flow is contributed to the main header. All pipe lengths and fittings contribute headlosses during LFG extraction system operation.

These calculations assume that there are 6 LFG header pipe segments that make up the critical flow path. The lateral connections and their flow contributions are not modeled as additional pipe segments. The losses due to the laterals are accounted for within the critical header segment modeled. The header pipe length modeled is 900 ft since this length is the maximum used for the header pipe layout (EW01A to dripleg DL02). A header pipe segment flow of 100 cfm is modeled as the average maximum flow expected throughout the critical flow path.

Design Criteria

- Each gas extraction well will provide 10 cfm LFG for a 9-well total of 90 cfm maximum system flow (Use 100 cfm). This is a conservative estimate based on experience and known site conditions.
- The LFG header pipe is standard dimension ratio (SDR) 17 high-density polyethylene (HDPE) pipe. The inside cross-sectional area of 6-in. diameter

SDR17 HDPE pipe is 0.183 sq. ft based on an actual inside diameter of 5.8 in. The inside diameter of 4-in. HDPE pipe is 3.955 in. (rounded to 4 in.), which results in a cross-sectional area of 0.087 sq. ft. Pipe friction losses are assumed negligible for the pipe and connection methods used (i.e., butt-fusion).

- The vacuum required at the furthest well (EW08) is -15.0 in. WC, which includes the well piping headlosses. Refer to the layout Drawing D1 for the well location.
- The LFG temperature is assumed to be 70°F, which is the most conservative value for the pipe sizing calculation

Calculations

Lengths and equivalent lengths of pipe were estimated using the tables and charts attached as sheets 6 and 7 of 7. Pipe sizes are all 6-in. diameter HDPE pipe. The headlosses are calculated using the "Headloss" program described below. For estimating headlosses in each pipe segment along the critical path, exact pipe lengths and fittings from EW01A to DL02 are counted for their respective contribution to headloss. The calculated headloss from this worst-case segment of the critical flow path was multiplied by six to account for each segment along the critical path. Refer to attached sheet 3 of 7 for the lengths and equivalent lengths estimated.

"Headloss" Model

The computer model "Headloss" is used to calculate headlosses within selected pipe segments based on LFG temperature, length of pipe, equivalent length of pipe connection fittings, inside pipe diameter, pipe material, and the LFG flow rate. The model selects the friction factor for the pipe and calculates the total headloss for the selected pipe segment. The Darcy-Weisbach equation is used along with the Moody friction factor.

Conclusion

The "Headloss" program input file is provided on attached sheet 4 of 7. The output file is attached sheet 5 of 7. The headloss in a typical header pipe segment is -0.928 in. WC. The total negative pressure (vacuum) requirement is summarized as follows:

- -15.0 in. WC = Vacuum required at well EW08
- -5.63 in. WC = 6 segments' total headloss (-0.938 x 6 segments)
- -20.63 in. WC = Total Negative Pressure Required

Conclude that total negative pressure required is -21.0 in. WC and the driplegs must be sized to handle the calculated vacuum pressures at a minimum.

**SUMMARY OF LENGTHS AND EQUIVALENT LENGTHS
AND MODELED PARAMETERS FOR CRITICAL PATH**

BLACKWELL LANDFILL SITE

Typical Header Section	Pipe Description	Length or Equivalent (ft)	Drawing Reference No.
<u>Well to Well</u>	Wellhead (15.0 in. W.C. required)	--	D1
	6-in. dia. gas header riser	5 (L)	D2
	6-in. dia. 45° elbow	7 (EL)	D2
	6-in dia. wye (branch flow)	30 (EL)	D2
	6-in. dia. gas header pipe to next well	900 (L)	D2
	6-in. dia. tee (run flow at 4-in. lateral connection)	10 (EL)	D2
	Total Length (L)=	905 ft	
	Total Equivalent Length (EL)=	47	
	Flow through modeled header=	100 cfm	

NOTES:

1. LFG extracted from a well is directed through the wellhead, the header riser fittings, the header pipe to the next well, and may pick up flow from a 4-in. header lateral along the way (see above).
2. 900 ft was selected as a conservative max. length of LFG header pipe between wells.
3. 100 cfm flow selected as modeled flow since it is the average maximum for entire critical flow path.
4. Six LFG header pipe segments are assumed for the critical flow path.
5. Losses due to lateral header connections to the main LFG header, including the flow contributions, are accounted for within the typical header segment modeled above.

INPUT FILE

p. 4 of 7

C:\>headloss

IS DATA BEING ENTERED FROM THE KEYBOARD OR A FILE?

ENTER "1" FOR KEYBOARD OR "2" FOR A FILE

1

ENTER PIPE LENGTH IN FEET:

35

ENTER THE EQUIVALENT LENGTH FOR FITTINGS IN FEET:

47

ENTER PIPE DIAMETER IN INCHES:

.8

ENTER THE TYPE OF PIPE:

1=PVC 2=HDPE

ENTER TYPE OF PIPE OR FITTING:

typical

ENTER PIPE INLET FLOW RATE IN SCFM:

30

ENTER PIPE INLET GAGE PRESSURE IN INCHES OF H2O:

0

ENTER THE GAS TEMPERATURE (DEG. F)

70

ENTER NUMBER OF STEPS FOR CALCULATION:

100

ENTER OUTPUT FILE NAME:

back.out

OUTPUT FILE

C:\>type black.out

THE NO. OF PIPES FOR THIS CALCULATION IS: 1

THE STARTING PRESSURE = .000 INCHES OF H2O GAGE

THE GAS TEMPERATURE = 70.0 DEG. F

PIPE DATA =====>

TYPE OF PIPE OR FITTING: typical

LENGTH = 905.0 FT.

EQUIV. LENGTH OF FITTINGS = 47.0 FT.

DIAM = 5.8 IN.

EPS = .000070 FT.

INLET FLOW = 100.0 SCFM

NSTEPS = 10

THE HEADLOSS FOR PIPE NO. 1 = .938 IN. OF H2O

THE PRES. AT THE END OF PIPE NO. 1 = -.938 IN. OF H2O GAGE

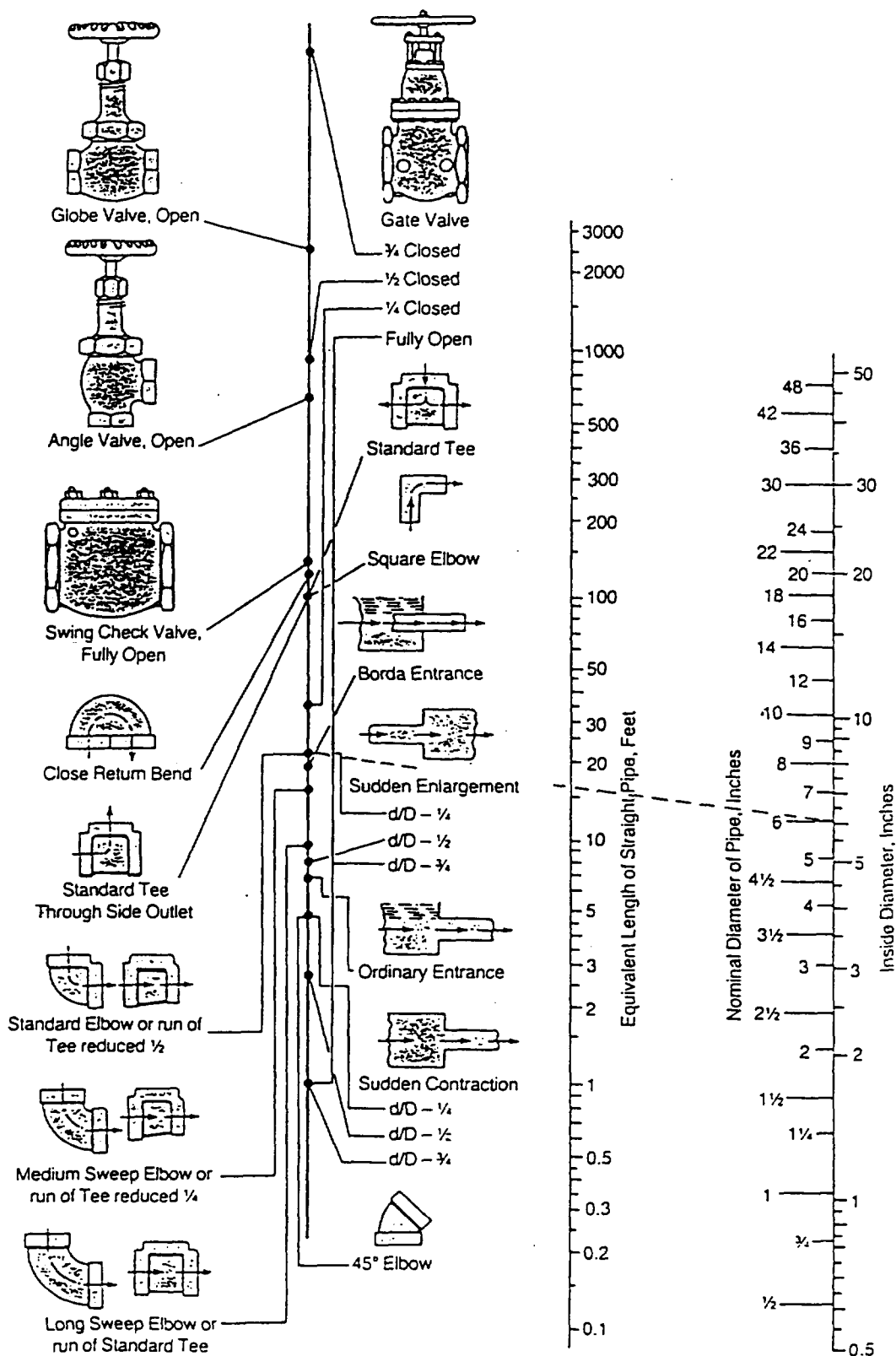
THE TOTAL HEADLOSS = .938 IN. OF H2O

C:\>

Resistance of Valves and Fittings to Flow of Fluids

Example: The dashed line shows that the resistance of a 6-in. standard elbow is equivalent to approximately 16 ft of 6-in. standard pipe.







Note: For sudden enlargements or sudden contractions, use the smaller diameter, d on the pipe-size scale. Head loss through check valves varies with types manufactured. Consult with manufacturer for correct values.



Fitting Pressure Drop: Listed below in Chart 5 are various common piping system components and the associated pressure loss through the fitting expressed as an equivalent length of straight pipe in terms of diameters. The inside diameter (in feet) multiplied by the equivalent length diameters gives the equivalent length (in feet) of pipe. This equivalent length of pipe is added to the total footage of the piping system when calculating the total system pressure drop.

These equivalent lengths should be considered an approximation suitable for most installations.

Chart 5

Fabricated Fitting	Equiv. Length
Running Tee 	20 D
Branch Tee 	50 D
90° Fab, Ell 	30 D
60° Fab, Ell 	25 D
45° Fab, Ell 	18 D
45° Fab, Wye 	60 D
Conventional Globe Valve (Full Open)	350 D
Conventional Angle Valve (Full Open)	180 D
Conventional Wedge Gate Valve (Full Open)	15 D
Butterfly Valve (Full Open)	40 D
Conventional Swing Check Valve	100D
(See Appendix for further data on resistance of valves and fittings to flow).	

D3

DRIPLEG DESIGN CALCULATION

DRIPLEG DESIGN CALCULATION

A. OBJECTIVE: In the event that active LFG extraction becomes necessary at the Blackwell Landfill Site, the negative pressure driplegs, DL01 and DL02, must be sized to handle the maximum expected operating vacuum pressure of the active LFG extraction blower.

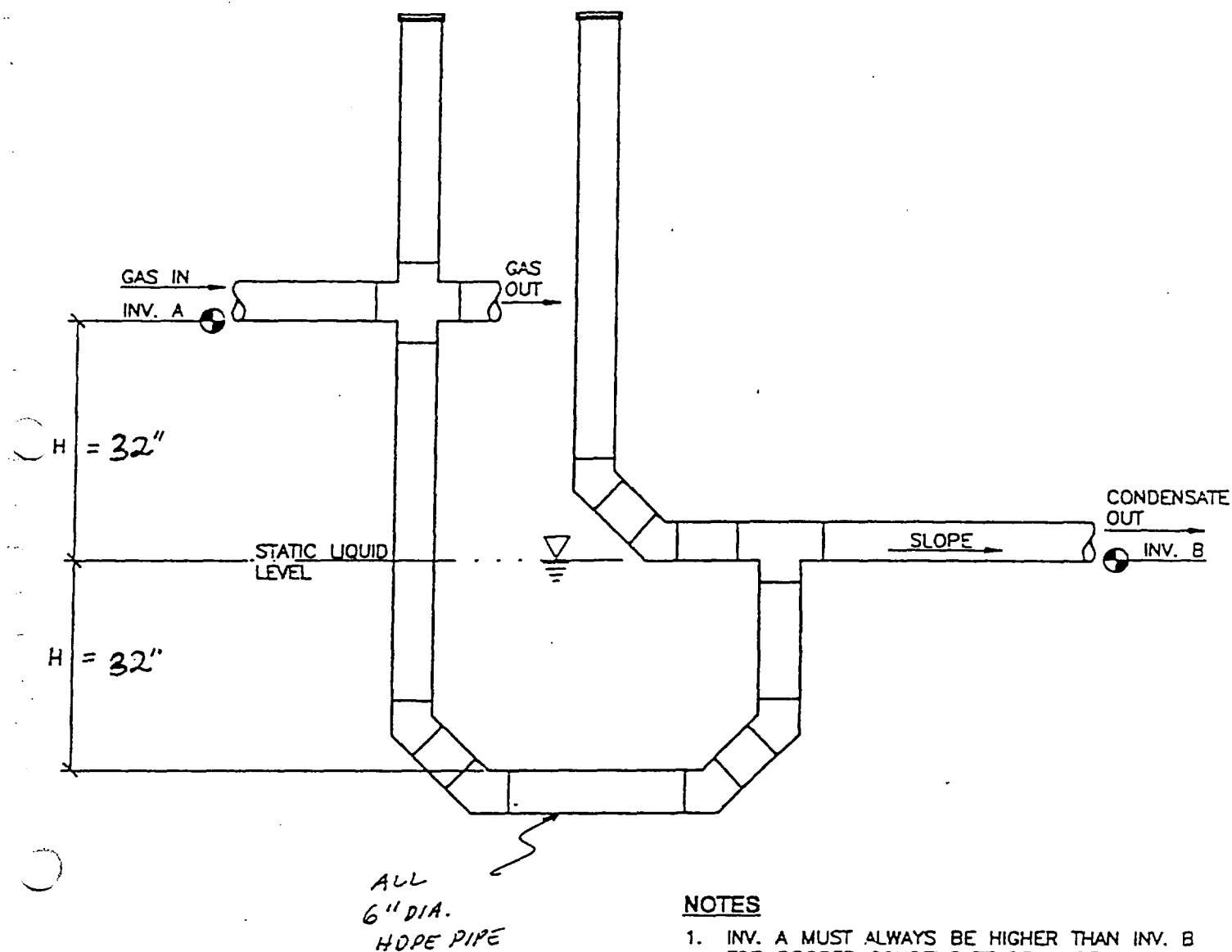
B. ASSUMPTIONS AND DESIGN CRITERIA:

- Simple "U-type" manometer design of dripleg filled with water/condensate.
- 21 inches water column (in. WC) is total system negative pressure (vacuum) requirement (refer to Negative Pressure Requirements Calculation).
- Vacuum on header side of dripleg, atmospheric pressure on discharge side of dripleg.
- Apply factor of safety of 1.5.

C. CALCULATIONS:

Determine height, H, necessary to prevent liquid from being pulled up and into gas header (refer to negative Pressure Dripleg Design Diagram).

- Total system vacuum pressure = -21 in. WC
- Vacuum pressure x 1.5 (safety factor) is: -31.5 in. WC
- Maximum operating blower pressure is assumed to be -32 in. WC
- Therefore, design dripleg with $H \geq 32$ in. (2 ft - 8 in.) see page 2 of 2..

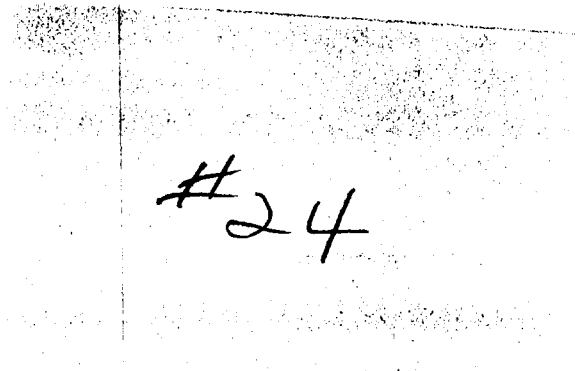
**NOTES**

1. INV. A MUST ALWAYS BE HIGHER THAN INV. B FOR PROPER CONDENSATE DRAINAGE.
2. FOR DRIPLEGS OPERATING UNDER NEGATIVE PRESSURE "H MIN." REPRESENTS THE MINIMUM LENGTH REQUIRED TO PREVENT CONDENSATE FROM BEING PULLED INTO THE GAS HEADER. LENGTH WILL BE DESIGNED FOR MAXIMUM OPERATING NEGATIVE PRESSURE OF BLOWER.

NEGATIVE PRESSURE DRIPLEG DESIGN DIAGRAM

DRAWING D1
LEACHATE COLLECTION SYSTEM LAYOUT

MAY BE VIEWED AT



U.S. EPA REGION 5
77 W. JACKSON BLVD.
CHICAGO, IL 60604-3590

DRAWING D2
EXTRACTION WELL AND PIPE DETAILS

MAY BE VIEWED AT

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77 W. JACKSON BLVD.
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DRAWING D3
LIFT STATION AND DRIPLEG DETAILS

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77 W. JACKSON BLVD.
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DRAWING D4
LEACHATE HOLDING TANK DETAILS

MAY BE VIEWED AT

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